STATE OF CALIFORNIA
The Resources Agency
Department of Water Resources
Northern District

CLEAR LAKE WATER QUALITY DATA

OCTOBER 1975

FOREWORD

Because of the unique biological conditions existing in Clear Lake, it has been a subject for study since 1874 when a Mr. Stone examined its fishery. Since that time numerous studies have been made concerning the fisheries and other aspects of the lake, such as water quality, biological primary productivity, and sediment production. The most pertinent and extensive studies have been made in the past two decades.

The Department of Water Resources has conducted a number of these studies and has collected a large volume of water quality and related data, most of which are available in the files of the Northern District office in Red Bluff. These data provide a basic understanding of the lake and are available to any person or agency planning on conducting studies of Clear Lake.

This report presents the data collected by the Department from 1968 through 1973. Numerical values are presented in tables and, in some cases, graphic form for easier interpretation.

Albert J. Dolcini
Chief, Northern District

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State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
Northern District

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CHAPTER I

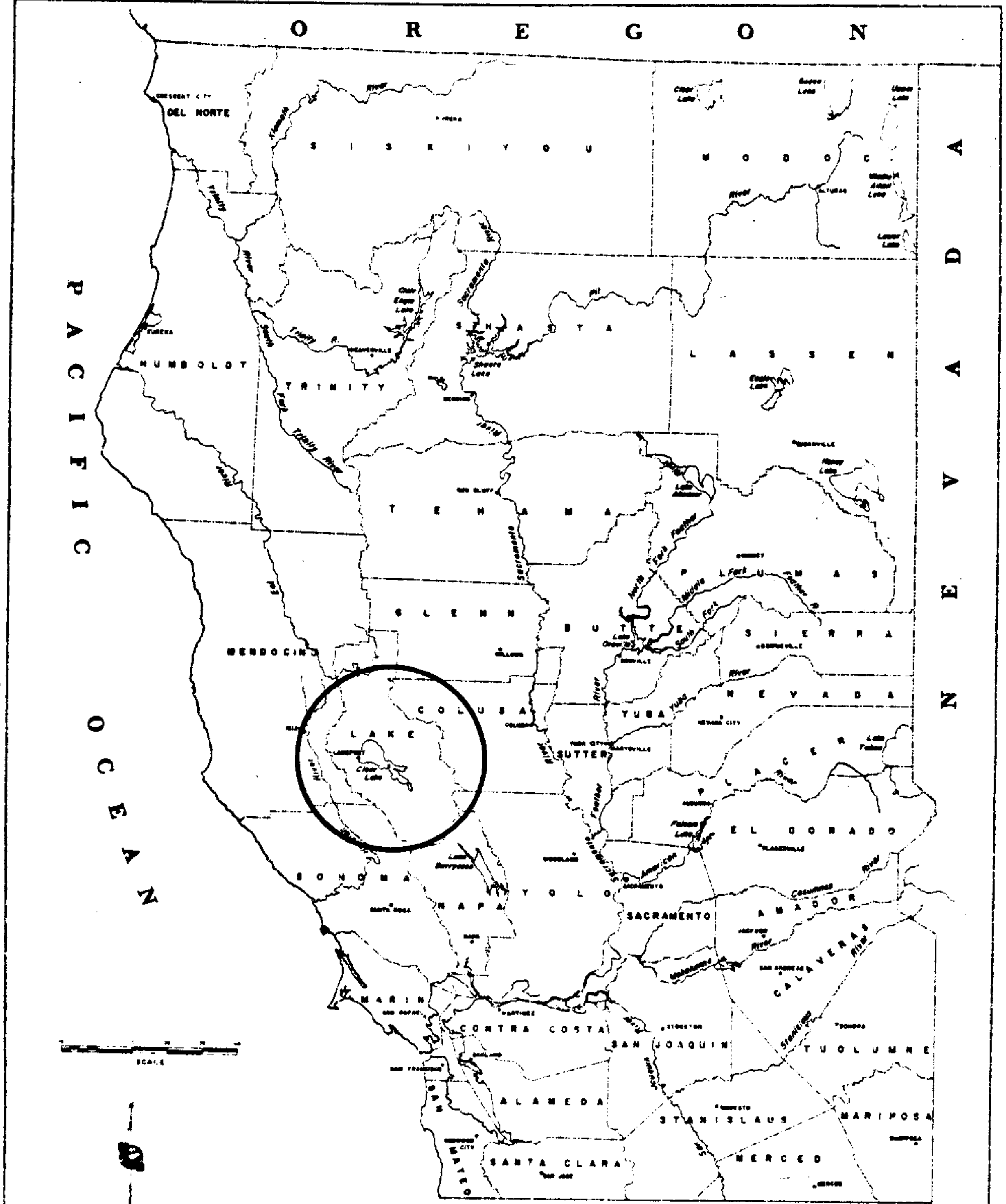
INTRODUCTION

Clear Lake, from which Lake County derives its name, is the largest body of fresh water wholly within California. For more than 100 years it has been a mecca for fishermen, boaters, vacationers, and those who love scenic beauty and a mild climate.

More recently it has become popular as a retirement area. One of the reasons for this popularity is its proximity to two major population centers, San Francisco, about 100 miles south, and Sacramento, approximately 80 miles southeast (see Figure 1).

The Clear Lake drainage basin is typified by steep, mountainous terrain interspersed with narrow valleys having soils with inherent high erodibility. Before man, streams that entered the large valleys adjacent to Clear Lake had changing water courses and deposited most of their sediment loads across alluvial plains. Man came, and in the process of claiming the land, channelized the streams, and soil materials flowing into the lake increased in rate and volume, carrying with them additional nutrients that stimulated the growth of planktonic algae. Today, these algae have become so abundant that at times areas of the lake appear almost solid. During winter, some of the materials entering the lake are kept in constant suspension by the waves and currents created by winds. Clear Lake then belies its name.

At some period in geologic time, according to one geologic hypothesis, there was no Clear Lake. A hydrologic divide existed in the lake area and waters drained to the east through Cache Creek to the Sacramento River and to the west through Blue Lakes and into Cold Creek and the Russian River. These conditions changed when a lava flow blocked the Cache Creek drainage at a point less than a mile northeast of the present village of Lower Lake. Water ponded behind this lava dike to form a lake. As the water rose, the original hydrologic divide was breached and the whole area became tributary to the Russian River on the west. Later, a landslide blocked Cold Creek at the western end of Blue Lake and Clear Lake was thus formed between a landslide and a lava flow. The lake's waters continued to rise and in time the lava flow was breached and the ponded water once



LOCATION OF CLEAR LAKE

again flowed into Cache Creek[1]. However, the validity of this hypothesis is doubtful as recent geologic evidence indicates that there has probably been a large freshwater lake at Clear Lake for over 1 million years. This estimate was made by the U. S. Geological Survey, based on preliminary evaluation of data collected during a special Lake County study that included collecting a series of sediment cores from as deep as 400 feet in Clear Lake.

The ^{14}C dating of these cores gives a sediment age of the Upper Arm of 40,000 years and extrapolation by sediment gives 75,000 years. However, evidence is that the Cache Beds (old lakes) partially lie under volcanic rock dated 0.5 to 1 million years old.

The lake appears to be of volcanic origin such as Crater Lake in Oregon, with about 50 percent of its edges formed by volcanic explosions or collapses. The Lower and Oaks arms appear to be formed by grabens (block down-faulting) and the Upper Arm either a fault-tilted block or lying over the central magma chamber of the volcano.

Other core data indicate the lake has undergone several filling and emptying cycles, one occurring in the past 40,000 years.

The aquatic macrophytic vegetation (rushes, cattails, etc.) in the sediments of the Lower Arm indicate that this lower part of the lake was quite shallow until about 12,000 years ago and has become deeper because of volcanic action.

Verification and clarification of these findings will depend on the final report of the U. S. Geological Survey's evaluation of these data.

Previous and Present Studies

This section lists all known previous and present studies being conducted on Clear Lake by an agency or individual, and summarizes the purpose and types of data collected.

No attempt has been made to include their data within this report. The studies are grouped by State, County, U. S. Government, and private corporations or individuals.

1/ The Lakes of California, Report of State Mineralogist, Wm. Davis. Calif. Journal Mines and Geology. Vol. 29, Nos. 1 & 2. Jan. and April 1933.

Department of Water Resources

In 1957 the Department published Bulletin No. 14, "Lake County Investigation". This report did not deal with the lake directly, but concerned itself with an inventory of the underground and surface water resources in the Big Valley, Scott Valley, and Upper Lake areas. It also made estimates of the 1953 and probable ultimate supplemental water requirements for these areas and presented plans for water development works. There are no basic data on Clear Lake included in this report.

In 1961, the Department published Bulletin No. 90, "Clear Lake-Cache Creek Basin Investigation". This report had as its objectives the formulation of a comprehensive plan for development of the water resources of the Clear Lake-Cache Creek Basin for conservation, flood control, recreation, and fish and wildlife. Little or no basic data on Clear Lake were collected.

In July 1963 the Department began a water quality study of Clear Lake. The purpose of the study was to define the chemical quality of the lake and identify any water quality problems. The findings of the Clear Lake study were printed in Bulletin No. 143-2, "Clear Lake Water Quality Investigation", published in March 1966.

In 1967 the Department published Bulletin No. 171, "Upper Eel River Development, Investigation of Alternative Conveyance Routes". This bulletin contained conclusions which, among other things, indicate that routing of Eel River water through Clear Lake would not result in any substantial alleviation of the lake's algae and turbidity problems. This conclusion was based on water quality studies published in an interim office report in August 1966. The data in the interim report were collected to evaluate the water quality of proposed new impoundments on the Eel River, new and old impoundments along the proposed conveyance routes, and effects on the Sacramento River.

The reliability of these conclusions was limited in that many of the sources of nutrients in Clear Lake had not been determined and a reasonably reliable nutrient balance of the lake had not been developed. Also, the existing biological conditions of Clear Lake had not been defined and factors affecting algae growth in Clear Lake had not been studied in detail.

Since publication of the 1966 water quality report, the Department's Northern District has continued studying Clear Lake to refine the chemical, physical, and biological information.

In December 1972 another report entitled "Appendix C - Clear Lake Water Quality" was published by the Department's Northern District staff. This report is part of a larger Northern District office report which further discusses alternative Eel River projects and conveyance routes.

In regard to the existing conditions in the lake, Appendix C concluded:

1. The three arms of Clear Lake behave more like three individual lakes than portions of a single lake.

2. Thermal stratification occurs at times in all three arms of the lake and prevents the waters from being mixed. This stratification is short-lived, but can occur within a short period of time during the warm summer months and can also be destroyed quickly by wind-induced currents. This phenomenon apparently occurs a number of times through the year.

3. During the fall, winter, and early spring, algae growth appears to be limited by insufficient light penetration. This is not true for late spring and summer. Turbidity levels are low during these periods and light can penetrate to great depths.

4. During the summer, algae productivity reaches high levels and growth declines only when either nitrogen or phosphorus concentrations are reduced in the water column.

5. Though there are numerous sources of these two nutrients, natural runoff to Clear Lake is the prime source. Other major sources are precipitation and ground water inflow which contain nutrients contributed by percolating domestic wastes and agricultural fertilizers. In addition, nutrients can be provided by fixation of atmospheric nitrogen by algae, dissociation of nutrients from other compounds, and recycling from organic or inorganic sediments.

6. The soluble nitrogen in the inflow is a source for the algae productivity at the beginning of the spring period. As this nitrogen is used, nitrogen-fixing algae maintain their supply by converting atmospheric nitrogen to ammonium. This process then becomes the primary source of nitrogen. Without nitrogen fixation, algae populations and volumes would be greatly reduced for the remainder of the year.

7. About the time that the soluble nitrogen is depleted, thermal stratification occurs. This phenomenon, with its attendant loss of oxygen from the bottom waters, produces a profound effect on the lake's ecosystem by changing the lake bottom from an aerobic to an anaerobic system. Stratification prevents the recirculation of nutrients, especially phosphorus, that have recycled from the organic debris and sediments on the lake's bottom. When the lake becomes destratified, these recycled nutrients are rapidly mixed in the water column and become available for biological productivity. Algae volumes again increase until late fall when the lake becomes turbid from the winter storms.

Department of Parks and Recreation

Studies by the State Department of Parks and Recreation were conducted at Clear Lake during 1969 and 1970 to estimate existing water-associated recreation use and to determine major recreation activities which could be affected by water quality changes resulting from imported Eel River water. Results of these studies were published in December 1972 as Appendix D to the Department of Water Resources Northern District office report on Alternative Eel River Projects and Conveyance Routes.

The 1969 survey included aerial counts and concurrent interviews of recreationists on 34 randomly selected days. Recreationists were interviewed to obtain subjective opinions regarding desirable and undesirable features of the lake and other data. Data were also obtained on activity participation, visitor origin, number of people per car, overnight accommodations, length of stay, and frequency of visits to Clear Lake. In 1970, recreationists were interviewed at five major use areas where water quality samples were also collected to evaluate the impact of water quality on recreation use.

Extrapolation of the aerial counts indicated that about 6 million hours, or 1 million recreation days, of water-related recreation use were spent at Clear Lake during 1969, (confidence limits of ± 14 percent). Adjustments based on the interview data to account for recreationists not included in the aerial counts would increase this estimate about 20 percent to 1.2 million recreation days in 1969, and 1.25 million in 1970.

The investigation concluded that water quality is an important factor influencing recreation at Clear Lake, particularly water-dependent activities such as swimming and waterskiing. The impact of water quality on recreation use is difficult to measure because water quality varies with time and location, and people's opinions about water quality vary widely.

Interviews of recreationists during 1969 and 1970 indicated that most recreationists considered Clear Lake generally satisfactory for major recreation activities. Water quality conditions were usually considered satisfactory, except during periods when severe algal blooms were present. Water quality was the specific condition most frequently considered unsatisfactory. However, various other conditions related to recreation facilities and their maintenance, regulation of boaters, and miscellaneous other problems also caused frequent complaints. Significant statistical correlations were obtained between the frequency of water quality complaints at Clear Lake and levels of total phytoplankton, blue-green algae, total phosphorus, total nitrogen, and organic nitrogen.

Comparison of Clear Lake with nearby competing reservoirs indicated that recreationists were attracted to Clear Lake by its extensive recreation facilities, good fishing, accessibility, and large size. They considered its water quality poor in comparison with the other sites.

Data obtained from interviews of recreationists indicated potential recreation use at Clear Lake was reduced by an estimated 550,000 recreation days in 1970 due to water quality conditions.

Department of Fish and Game

In December 1972, the Department of Fish and Game published a report, Appendix E of the Department of Water Resources Northern District report on Alternative Eel River Projects and Conveyance Routes, discussing the potential effects on fish and wildlife of routing Eel River water through Clear Lake. The report lists and discusses fish observed or previously reported from Clear Lake, mammals, and birds of the Clear Lake watershed. The birds are categorized as to fish-eating, those preferring marsh habitat, and "other" birds.

Also included is a discussion on the shoreline habitat, which was delineated and measured using a series of colored aerial photoslides taken in June 1971 to identify approximately 1,735 acres of marsh and riparian habitat around the periphery of the lake. These areas were presented on a map. The report also includes the results of a survey conducted during 1969 to determine the existing angler use and catch at Clear Lake.

Fishermen expended about 1,900,000 angler hours at Clear Lake in 1969. An average fishing day for boat anglers was 5.6 hours, whereas shore anglers averaged 6.3 hours. Boat anglers fished about 170,000 days and shore anglers fished about 140,000 days, for a total of 310,000 angler days. Night fishing, which was mostly from shore, averaged 10 percent of the day use. A reasonable estimate of total use in 1969, including 30,000 days of night fishing, is 340,000 angler days.

Fish harvesting figures show that Clear Lake supports one of the best warmwater fisheries in California. For example, in 1969 sport fishermen caught about 1,300,000 pounds of fish in Clear Lake and commercial fishermen caught approximately 436,000 pounds of carp and blackfish. The harvest rate in 1969 for all methods of fishing was 42 pounds per acre. More estimated time was spent fishing (2,070,000 hours) than was spent for boating and skiing (1,135,000 hours), picnicking (110,000 hours), swimming (1,645,000 hours), and other recreation (1,000,000 hours). The Department of Fish and Game concluded that recreation at Clear Lake is based mainly on the fishery. Fishing is the primary water-related activity during the winter, spring, and fall months.

The report concludes that routing Eel River water through Clear Lake would present no evident opportunities to improve fish and wildlife, while it would introduce the possibility of damaging the lake's fish and wildlife resources. Potential causes of damage listed were (1) reduction in nitrogen concentrations with resultant reductions in fish and wildlife food supplies; (2) modifications in Rodman and Cache sloughs with a resultant loss in important fish and wildlife habitat (tule areas); and (3) increased shoreline development which could result from reduced lake level fluctuations and thereby cause a further loss in fish and wildlife habitat.

University of California, Berkeley

In partial fulfillment for the degree of Doctor of Philosophy in Engineering, Suresh A. Gaonkar, under the direction of Dr. W. J. Oswald, at U. C. Berkeley, made an extensive study of the growth characteristics of the blue-green alga *Aphanizomenon* (Clear Lake species) in a defined nutrient medium. This study also included determining the use of *Selenastrum capricornutum*, a green alga, to evaluate factors that could limit algal growth in Clear Lake. The study was supported in part by the County of Lake, State Department of Water Resources, and the U. S. Environmental Protection Agency.

The objectives of the study included: (1) evaluation of growth characteristics of Clear Lake *Aphanizomenon* in a defined medium in the laboratory; identification of nutrients essential to the alga; determination of algal biomass in Clear Lake in order to determine the extent of the algal problem; and (3) determination of algal growth potential of the water in Clear Lake, various inflowing streams to Clear Lake, sediment suspensions, and extracts from algae.

Literature concerning studies performed on *Aphanizomenon* was extensively reviewed.

Algal growth potential of Clear Lake water, influent streams, sewage flows, bottom sediments, etc., was determined by using filtered water samples and inoculating them with a test alga, *Selanastrum capricornutom*. Growth rates of this alga were then determined and an estimate of growth potential of the water samples obtained.

The researcher then developed a special inorganic medium in which he was able to maintain a healthy unialgal culture of colonial forms of the alga *Aphanizomenon*. These cultured algae were then used in the growth studies.

Growth characteristics of the alga were determined using *Aphanizomenon* cultured in the laboratory in an inorganic medium. Several factors were tested for their effect on the alga, including light intensity and various concentrations and forms of inorganic carbon, nitrogen, phosphorus, iron, calcium, sulfur, magnesium, potassium, sodium, cobalt, Vitamin B_{12}, and trace elements and growth hormones. Growth of purified Clear Lake *Aphanizomenon* in filtered Clear Lake water was then studied with the same factors applied.

In addition to the extensive laboratory studies, several physical and chemical parameters of the lake were monitored at five stations from October 1969 to October 1970. Physical parameters measured included temperature, light transmission, and alkalinity. Biological parameters measured included algal biomass and algal growth potentials (using *Selenastrum capricornutum*), rate of release of algal growth potential from bottom sediments, availability, and rate of uptake of nitrogen and phosphorus by *Aphanizomenon*. Also studied were algal growth potential of creek water samples, waste effluents from Lakeport City Sewage Treatment Plant, extracts of floating algae from Clear Lake, and Clear Lake bottom mud extracts. Total volatile matter in the Clear Lake bottom mud was also determined.

By correlating the results of laboratory investigations and the findings of lake investigations, the researcher was able to draw extensive conclusions concerning the physical, chemical, and biological environment of Clear Lake, including availability and sources of nutrients, uptake of nutrients by algae, inhibitory factors affecting the algae, and the time of year each limiting factor was operating. Recommendations for algal control were given and various methods discussed. They included chemical or biological control, sewage treatment and waste diversion, aeration, flushing, dredging, and algae harvesting.

Dr. J. W. Oswald, Professor of Public Health and Sanitary Engineering at U. C. Berkeley, has been working on a mechanical device for the removal of algae mats which form on the surface of Clear Lake and other bodies of water, since 1969. He has developed a small scale model of an algae skimmer and screen that demonstrates the technical feasibility of such a device. This model was operated in Clear Lake and enough operation costs obtained to permit a preliminary economic analyses of algae removal by mechanical harvesting. These preliminary figures show that such a method is practical only when there are large concentrations of algae on the surface.

A larger model is now under construction that will be tested in Clear Lake in 1975 with the objective to determine if a practical operating procedure can be devised that will economically contribute to lake improvement through algae removal by this mechanical harvester.

University of California, Davis

In 1959 Dr. Charles Goldman made a study of the fertility of Clear Lake as measured by the rate of carbon fixation by the primary producers. Primary productivity was estimated by obtaining samples at half-meter intervals from the surface to the bottom, inoculating the samples with $Na^{14}CO_3$ and then suspending the sample the depth from which they were collected. After 4-hour incubation, the samples were filtered and the radioactivity measured with an automatic gas flow Geiger-Muller counter. Primary productivity was then calculated from a knowledge of initial activity, activity of the filtered algae, initial inorganic carbon content, and incubation time. These measurements of primary productivity were made monthly from May of 1959 to July of 1960. In addition, temperature, oxygen, turbidity, and pH measurements were made on the water column at the time of each productivity survey. Periodically, samples were analyzed for their cation concentrations by flame spectro-photometry, and nitrate-nitrogen was determined. Solar radiation at the surface of the lake was measured using a portable pyrheliometer.

Clear Lake was again studied by Dr. Goldman in 1969. For this study a raft was anchored in a shallow part of the lake just offshore from Lakeport, a location with deep sediment layers considered to be characteristic of the main lake basin. The temperature, transparency, pH values, conductivity values, oxygen content, and alkalinity, were measured throughout the entire water column. The water from several depths and from the sediment surface was analyzed in the laboratory for total soluble, and particulated phosphorus, nitrate, ammonia, and iron. Primary productivity was measured by means of ^{14}C in situ assay. Samples for phytoplankton biomass determinations and species composition were preserved in the field for later counts.

Several polyethylene tubes and two rigid ones (a transparent tube made from plexiglass and a dark one from galvanized steel) were installed beside the raft and the water columns inside them investigated in the same way as the free water.

Experiments were also conducted using bags made from dialysis membrane. In initial experiments these were filled with double glass distilled water and exposed at three depths in the sediment for various time periods (usually one week). In later experiments using dialysis membrane bags, the bags were filled with sucrose solution and exposed for only four hours. The quantity of ions which penetrated the tubing was then analyzed to determine the relative mobility of phosphorus, iron, and nitrogen.

Besides these regular in situ investigations, a number of laboratory experiments, one field experiment, and a large scale synoptic survey was made.

Dr. Robert L. Rudd has been conducting a long-term study on pesticides with the objectives of determining the occurrence and identifying the effects of pesticide cycling within the watershed. The study focused on the mechanics of cycling from the lake water to lake biota to lake birds to lake sediments and back to entry in the water again. Samples from soils, inflowing streams, lake water column, and lake sediments have been collected and analyzed for known pesticides used in the watershed.

California State University, Sacramento

In 1965, investigators under the direction of Professor Leonard Hom conducted an extensive inventory of waste discharge facilities in the Clear Lake basin area. This inventory was made in compliance with an agreement with the State Water Quality Control Board; its purpose was to locate existing waste discharges in the Clear Lake basin and list the ownership, flow volume, character of the waste, the type of treatment afforded, and evaluate the uses of the receiving waters. The data were presented in a publication titled "Evaluation of Water Pollution Potential, Clear Lake Basin", 1965-1966.

Lake County

The natural productivity of Clear Lake has created both benefits and problems. The benefits have resulted from the tremendous fish production, whereas the problems have resulted from the overproduction of the so-called "Clear Lake" gnat and the blue-green algae.

The residents of Lake County have spent thousands of dollars since 1949 trying to curb the overproduction of these two pests.

In 1961 the State of California, through its Department of Public Health, Vector Control Section, appropriated an annual sum of $40,000 to assist the County of Lake in its efforts to achieve gnat control. As a result, one of the most extensive studies on Clear Lake has been conducted by Lake County Mosquito Abatement District and was centered on the control of the so-called "Clear Lake Gnat" (Chaoborus astectopus).

The Clear Lake gnat, which is really a midge, does not compete with man for food or fibre, does not bite, and does not seriously affect the public health. However, the adult gnat is a major nuisance during the warm summer months because it emerges at night and has a strong affinity for light. Lakeside outdoor nighttime activities requiring lights attract swarms of gnats that fill the air and enter the hair, eyes, ears, and food.

Study of the gnat began in the late 1930's, but attempts to control the insect were not made until 1949, when one of the new post-World War II chlorinated hydrocarbon insecticides (DDT) was applied to the lake. This control method, though successful at first, caused some harmful effects on nontarget organisms. Also, the target insect developed immunity to the control chemical. The residents of Lake County, acting through the Lake County Mosquito Abatement District, then approached the control problem by initiating research in gnat control by use of a pesticide that was specific to the target and not detrimental or harmful to nontarget organisms, and by biological control -- that is, through a natural predator such as a fish, or a disease or virus that attacks the gnat only. As a result of this research, the gnat has been controlled since 1962 by introduction to the lake of an organic phosphate compound, methyl parathion. This insecticide, which deteriorates rapidly, effects control in low concentrations. With this control, biological studies were terminated. The

Mosquito Abatement District's efforts since have been directed mainly toward continued gnat control by chemical methods.

Basic data collected during this program, which began in 1961, include temperature and dissolved oxygen profiles of the water column, Secchi disc readings, water column zooplankton and phytoplankton volumes and composition, and gnat larvae concentrations in the sediments. These data are on file in the Lake County Mosquito Abatement District offices in Lakeport.

Clear Lake Algae Research Unit

In 1968, a newly formed county unit began the most intensive studies on algae productivity and related problems in Clear Lake. This unit, the Clear Lake Algae Research Unit, was and is presently jointly funded by the County of Lake and the State of California through the Department of Water Resources. Directed by Dr. Alex J. Horne, the unit has three functions. These are:

1. Collecting all available published and unpublished work relevant to algal growth problems and control on Clear Lake, and establishing a data depository.
2. Acting as a research laboratory to investigate those problems of algal physiology and control which are considered important.
3. Acting as a research and development center for methods of algal control insofar as these are based on sound knowledge of the algal nuisance problem and its causes in Clear Lake.

Since its inception this unit has published five progress reports. The first report covered the work undertaken from 1968 to 1970 and was published in June 1971. The remaining four reports cover the work done during 1970-71, 1971-72, 1972-73, and 1973-74.

The reports state that the unit has made extensive studies in the lake on identification, distribution, biomass, physiology, nitrogen metabolism, and the physiocochemical environment affecting growth of the nuisance causing blue-green algae *Aphanizomenon*, *Anabaena*, and *Microcystis*. An unusual bloom of the dinoflagellate *Peridinium pernardii* in the Upper Arm was also surveyed.

The unit directed its field efforts towards studying the simultaneous regional variations of N_2 fixation, carbon fixation, algae and related parameters in each of the three lake basins, especially during algal blooms. During these surveys, measurements were made of N_2 fixation, algal heterocysts, phytoplankton cell numbers, NO_3-N, NH_4-N, dissolved organic N, PO_4-P, Fe, primary production, particulate carbon and chlorophyll a. Statistical analyses were performed on data collected during each of the synoptic surveys and the simple correlation coefficient "R" was computed for all variables taken by pairs.

These studies defined the importance of biological nitrogen fixation as a source of nitrogen to the lake. The seasonal variation in N_2 fixation and variation in fixation with depth were studied using the acetylene-reduction technique and the quantities of N_2 fixed in each basin were estimated from the daily rate of acetylene reduction. The work also included a study of the relationship between N_2 fixation and nuisance blooms of blue-green algae and their heterocysts.

The unit also investigated and evaluated various methods of algae control to determine, in light of present knowledge, which methods would be most effective and economical in Clear Lake. Control methods by aeration mixing, chemical application or removal, biological changes, and mechanical harvesting were evaluated.

To determine the feasibility of algae control by aeration in Clear Lake, a small scale, short-term aeration experiment was carried out in the Oaks Arm in late autumn 1972. Two stations were used in the Oaks Arm: one as a test station and the other as a control. Both stations were monitored before and during the experiment for changes in temperature, D.O., chlorophyll a, turbidity, pH, dissolved inorganic carbon, N_2 fixation and light penetration.

Nutrient limitation or inhibition experiments were conducted in bottle tests in the laboratory. Though a number of different chemicals were used, the experiments indicated that the addition of copper in trace quantities suppressed N_2 fixation and blue-green algae growth.

An extensive evaluation was then made of the effect of copper additions on blue-green algal growth and nitrogen fixation. Samples of phytoplankton from the Upper Arm during the September 1972 *Anabaena* bloom were cultured in the laboratory and subjected to 5, 10, 50 µg/l $CuSO_4$-Cu. Substamples were collected and analyzed every two days for nitrogenase activity, ^{14}C uptake, and chlorophyll a content. These laboratory studies showed that 10 µg/l of Cu caused inhibition of nitrogen fixation, though rates of photosynthesis remained relatively unchanged.

In situ investigations concerning the effect of trace concentrations of copper on the blue-green algae were undertaken using large amounts of lake water contained in large polythene tubes suspended in the lake. Samples collected from the tubes were also analyzed for nitrogonase activity, ^{14}C uptake, and chlorophyll a, in addition to their ionic and dissolved organically-bound Cu variations with alkalinity, pH, and temperature changes.

Methods of algae control by biological methods were not pursued because of lack of basic research in this area and of the possibility of not being reversible or of other uncertainties.

The Clear Lake Algae Research Unit concluded that the best prospects for whole-basin control are aeration/mixing in the Lower and Oaks Arms and suppression of N_2-fixation by trace levels of copper in the Upper Arm.

Work has moved forward to implement this algae control and a full scale aeration project has been developed for the Oaks Arm. The project is expected to be operational in the spring of 1975. Funds are now being sought to proceed with lakewide tests of copper inhibition on the nitrogen-fixing blue-green algae.

U. S. Geological Survey

In June 1968, the U. S. Geological Survey began a one-year water quality study on Clear Lake. The purpose of this study, which was partly funded by the California State Water Quality Control Board, was to determine the source, abundance, and distribution of nitrogen and phosphorus in the lake and throughout the watershed in respect to time.

A report issued in March of 1973 contained primarily basic nutrient data collected during the study. These data were collected from the principal tributaries to the lake, in both the water and sediments of the lake itself, from the lake outflow, in ground water, precipitation, and from sewage treatment plant effluent.

In addition, measurements made of the major tributary inflow to the lake enabled calculations of the monthly distribution, by percentage, of inflow and a monthly lake water budget.

U. S. Soil Conservation Service

In conjunction with other federal and state agencies, and at the request of the Department of Water Resources, the U. S. Soil Conservation Service made a study of sources and causes of sediment yields in the northern California coastal areas, which included the Clear Lake basin.

The objectives of this study were to (1) estimate the sediment yield by sources and causes under present conditions, (2) estimate the future sediment yield under the expected use and management, (3) formulate a land treatment program that would reduce the sediment yields and estimate the costs of remedial measures and, (4) evaluate the physical effects of the recommended program.

A report covering the findings and recommendations of this study was published in June of 1972. Data in this report includes topography, geology, soils, vegetal cover types, land use, ownership, and administration of the study areas. Also included is information on sediment and debris deposition and estimated contributions from landslide, streambank and sheet and gully erosion.

National Park Service

In 1947, the National Park Service prepared a report for the U. S. Bureau of Reclmation on Clear Lake recreation potential in relation to the Yolo-Solano Project. The report discussed the impact of stabilizing the water level of Clear Lake on recreation use and development. It estimated that about 355,000 visitors registered at hotels and resorts in Lake County in 1946. About 55 percent of the registrations were assumed to be at resorts near Clear Lake and the average length of stay was estimated at three days. The report assumed that approximately 80 percent of the lake properties catering to tourists were affected by water level fluctuations and thus arrived at an estimate of 468,000 visitor days (recreation days) affected by Clear Lake water fluctuations. On the basis of these estimates, total recreation use at Clear Lake for 1946 was about 585,000 recreation days. This report apparently assumed all recreation use at Clear Lake was water-associated.

Wilsey and Ham

The engineering consulting firm of Wilsey and Ham prepared a report on recreation in the Cache Creek basin for the Department of Water Resources in 1958. Based primarily on traffic counts made by the Division of Highways on July 14, 1958, and estimated capacity of overnight accommodations in the basin, the consultants estimated the user days for a summer weekend day. The records of two resorts were analyzed to determine the relationship between the number of guests on an average Saturday in July and August and the annual number of guests. These data enabled determination of an expansion factor that in turn provided an estimate of 2,300,000 annual user days in the Cache Creek basin for 1958. The report assumed that all this use was water-associated. Although this estimate presumably referred to recreation use in the Cache Creek basin, most of the information used to develop it related only to Clear Lake.

Selected References

A considerable amount of technical information has been developed by other studies pertinent to the land use, hydrology, and of the Clear Lake basin, all of which can be most helpful in evaluating Clear Lake. Studies completed to date include the following:

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CHAPTER II

CLEAR LAKE AND ITS ENVIRONS

This chapter discusses the drainage basin of the lake, the climate, the use of the land surrounding the lake, industry in the area, and the use of water within the drainage basin, and concludes with a discussion of the physical characteristics and hydraulics of the lake itself.

Drainage Basin

The Clear Lake watershed, Figure 2, has a total drainage area of about 458 square miles excluding the lake surface, and is generally mountainous, characterized by northwest-trending ridges and valleys. Several of the larger valleys are suitable for cultivation. Elevations rise from 1,318 feet at the lake surface to 3,924 feet at Cow Mountain in the Mayacmas Mountains, which form the west side of the drainage area, and 4,840 feet at High Glade Lookout in the Bartlett Mountains east of the lake. Most Valley areas are adjacent to the lake, though some mountains rise abruptly from the lake shore.

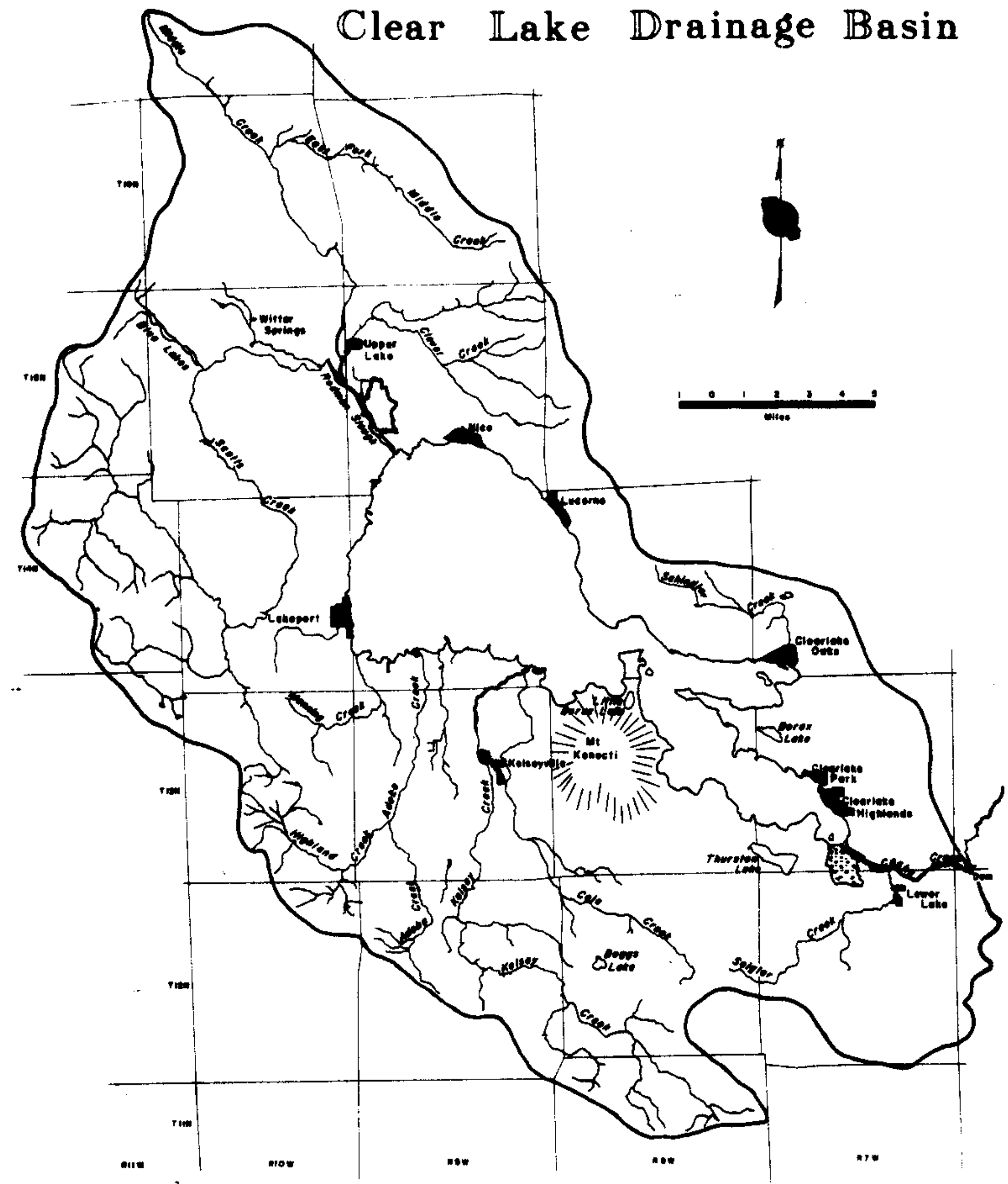
Major stream systems to Clear Lake are Kelsey, Adobe, Scott, Middle, and Seigler Creeks. The outlet from the lake is the headwaters of Cache Creek. Except for Cache Creek, the flow in these streams follows the seasonal pattern of the precipitation, with maximum flows usually occurring in the winter months and minimum flows in the late summer.

More than 70 percent of the drainage basin has less than 18 inches of soil mantle overlying impermeable formations; the shallowest soil mantles (0 to 6 inches) occur in the upper reaches of the watershed, where the heaviest precipitation is measured. Runoff starts as soon as the soil mantle becomes saturated, which generally occurs after 3 to 4 inches of precipitation.

Because of the shallow soil mantle and the intense precipitation on the upper reaches of the watershed, little water is retained by the soil and flooding occurs quite often in Clear Lake and its outlet, Cache Creek.

Climate

The climate of the Clear Lake Basin is generally characterized by dry summers with high daytime temperatures, and wet winters with moderate temperatures. Temperatures are influenced by the prevailing air


Clear Lake Drainage Basin
Middle Creek
Middle Creek
Witter Springs
Upper Lake
Clover Creek
Nice
Lucerne
Scotts Creek
Lakeport
Clearlake Oaks
Borax Lake
Mt Konocti
Kelseyville
Clearlake Park
Clearlake Highlands
Thurston Lake
Lower Lake
Cole Creek
Boggs Lake
Kelsey Creek
Highland Creek
Adobe Creek
Miles

masses. In the summer, a continual tropical air mass results in high daytime temperatures with moderate cooling at night. A marine air mass occupies the area in the winter and, as a rule, keeps the temperature from dropping below 20° F.

The Clear Lake area lies on the southern fringe of storms that periodically sweep inland from the Pacific Ocean during the winter. Precipitation consists almost entirely of rain, although snow of insufficient quantity to form a snowpack does occur at the higher elevations. The rainy season extends for about 7 months, from October through April. Approximately 85 percent of the seasonal precipitation occurs during the 5-month period from November through March, while July and August receive precipitation only in trace amounts. The wet period is by no means a season of continual precipitation because the "Pacific High" may assert itself, resulting in clear, relatively pleasant weather. The mean seasonal precipitation ranges from 23 inches near Kelseyville and 22 inches at Clearlake Park to 45 inches in the Bartlett Mountains to the east and the Mayacmas Mountains to the west and 65 inches on Cobb Mountain, 9 miles south of Clear Lake.

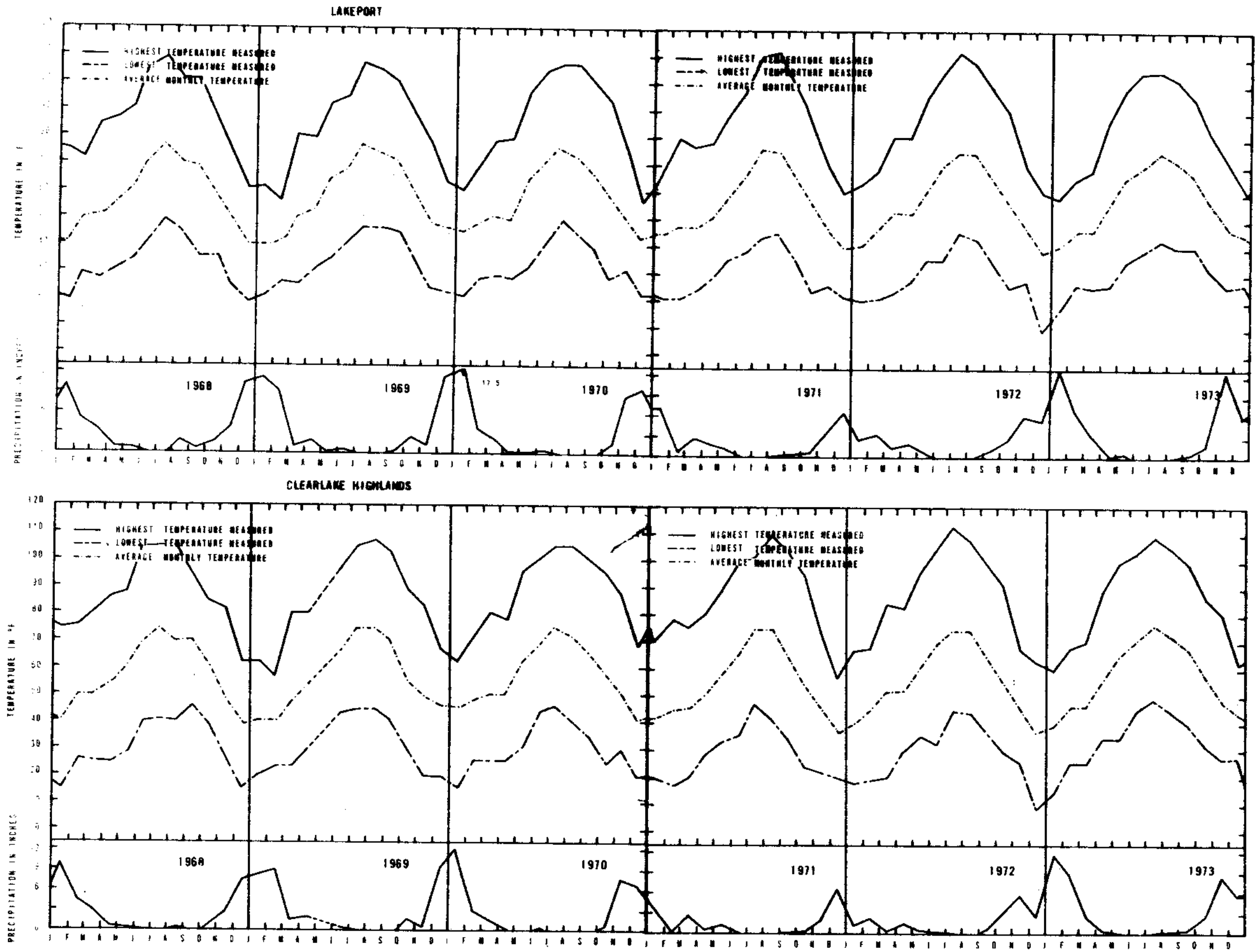
The high, low, and average monthly air temperature and the monthly amounts of precipitation for 1968 through 1973 measured at Lakeport and Clear Lake Highlands are shown on Figure 3.

Land Use

The estimated present permanent population of the Clear Lake drainage basin is 20,000 people. The major portion of this population is located in the urban sites near the shoreline of Clear Lake. Many of the houses, in both high and low density areas, are occupied during only a part of the year, or portions of the week throughout the year. The high density areas are not sharply divided by legal boundaries, but tend to merge into one another. Lakeport, the county seat, is the only incorporated city in the area.

Other communities have developed within the area away from the lake. These communities have no water-associated recreation industry and exist largely to serve the agricultural interests of the area.

Although less densely populated, the irrigated valleys surrounding Clear Lake are intensively used. Irrigated agriculture utilizes some



AIR TEMPERATURES AND PRECIPITATION AT LAKEPORT AND CLEAR LAKE HIGHLANDS 1968-73

Figure 3

22 square miles of area around the lake, with the principal crops being pears, pasture, alfalfa, walnuts, and grapes.

Industry

Recreation, especially water-associated recreation, and its related activities contribute a great deal toward the economy of the area. Wilsey and Ham, in their study of the Cache Creek Basin in 1958, estimated a recreation use of 2,300,000 visitor days. Current estimates run as high as 3,050,000 visitor days. Clear Lake has approximately 71 miles of shoreline, of which more than 40 miles is developed for water-associated recreation and permanent or summer homes. The development of much of the shoreline area for resorts and summer homes has been going on at an accelerating rate since modern highways have made the area more easily accessible. The demand for frontage on the lake for resorts has become so great that developers are finding it feasible to fill in low lying swamp lands to make more building spaces available.

According to the Chamber of Commerce, in 1969 Lake County had commercial lodging facilities for 12,000 people in hotel and motel units, 8,000 in trailer parks, and 7,500 in campgrounds. The peak tourist population exceeds 25,000 people, not including those using the 8,000 private or summer homes. In addition, the shoreline around Clear Lake is highly developed with marinas and beaches. To serve the water oriented recreationists there are approximately 100 public facilities supplying gasoline for boaters, 150 docks and piers, 40 boat ramps, 15 beaches, 7 boat repair shops, and 26 marine supply stores. The appraised value of the resort businesses is roughly $25 million, and the industry employs about 1,000 persons on a seasonal basis and 30 persons permanently. Total income from recreation in 1969 is estimated at about $30 million.

The livestock industry is important to Lake County, but most of the cattle raising occurs outside the Clear Lake drainage basin.

Other than farming and recreation, the only industry in the Clear Lake drainage basin is associated with sorting and packing the pear and walnut crops for export, mining of earth materials such as colored rock, and commercial harvesting of fish.

Clear Lake has the distinction of being the only lake in California supporting a commercial fishing business. Only two types of fish are commercially fished at this time, the carp and the blackfish. The fish are first caught by seining and then transported live in tank cars to market.

The quantities of fish removed (in pounds) from Clear Lake by commercial fisherman from 1968 through 1972 as recorded by the Department of Fish and Game are shown in Table 1.

TABLE 1

FISH COMMERCIALLY REMOVED FROM CLEAR LAKE
(In Pounds)

Year	Hardhead	Carp	Blackfish
1968	214,380	260,380	-
1969	-	294,725	258,270
1970	2	381,830	407,680
1971	-	266,175	307,750
1972	-	190,415	330,100

A survey made by the Department of Fish and Game determined that more than 340,000 angler days were expended at Clear Lake during 1969. The average catch per hour was 1.23 fish. The annual harvest rate by sport fishermen was about 21 pounds per acre for a total of approximately 650 tons. Over 98 percent of the fish caught were white crappie, black crappie, bluegill, white catfish, and brown bullheads.

Water Use

The Department of Water Resources estimated that agriculture in Clear Lake Basin used 38,000 acre-feet of water for irrigation in 1967, and that municipal and industrial use amounted to 3,700 acre-feet for the same year.1/

Most of the total supply is derived from ground water; approximately 3,000 acre-feet of surface water is pumped from the lake. The State Department of Health estimates that approximately half of the 3,000 acre-feet from the lake is pumped by 23 water companies that supply water

1/ "Ten Counties Investigation", Bulletin No. 184, December 1971.

for domestic use. The names of these companies, their locations, and approximate annual use are presented in Table 2.

The Lake

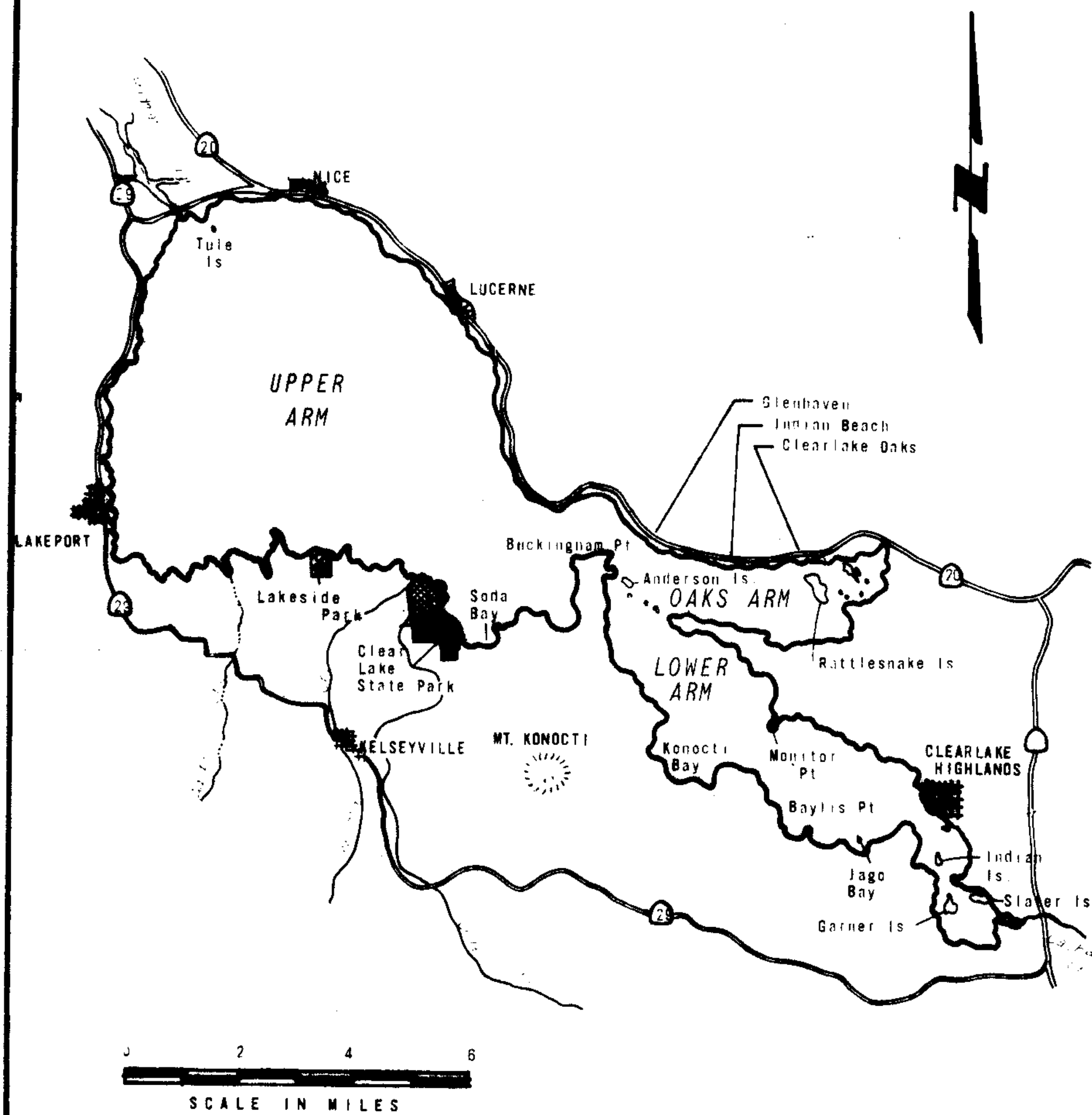
Clear Lake has a surface area of approximately 70 square miles. Its long axis, from Rodman Slough Bridge to its outlet at Cache Creek, measures approximately 18 miles. Its widest part, Lakeport to Lucerne, measures 8 miles. When the lake is at an elevation of 1,325 feet, its total surface area is 68.5 square miles, with a shoreline approximately 71 miles long and an average depth of 26 feet. The maximum depth of 60 feet occurs in the Oaks and Lower Arms.

Clear Lake, as shown on Figure 4, consists of three bodies or arms, each of which can be treated limnologically as a separate lake. The Upper Arm is separated from the Oaks Arm (east arm) and Lower Arm by a natural constriction formed by Buckingham Point and called the "Narrows". For purposes of this report, the Upper Arm is defined as that portion of the lake north of an east-west line drawn between the eastern tip of Buckingham Point and the southern tip of Glenhaven Point. The Oaks Arm is that portion of the lake east of a line from Glenhaven Point to the western tip of Sulphur Bank Point. The Lower Arm is the remainder of the lake to the outlet of Cache Creek near Indian Island.

The Upper Arm has a shoreline that is more varied in character than shoreline elsewhere around the lake. It varies from the gently sloping flatlands of Big Valley on the southwest side to the abruptly rising foothills of Pine Mountain and Pepperwood Cove on the east and Mount Konocti at Soda Bay. Except for the Clearlake Highlands area on the Lower Arm and the Clearlake Oaks area on the Oaks Arm, the Upper Arm has the only adjacent terrain suitable for development into large densely populated urban areas.

The Oaks Arm, trending in an east-west direction, is the smallest of the three arms and has the smallest drainage area surrounding it. The entire shoreline, except for the east end, is characterized by abruptly rising hills with narrow terraces of land near the shore which have enabled some permanent home and summer home development.

Figure 4



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

CLEAR LAKE

TABLE 2

LIST OF WATER COMPANIES PUMPING FROM CLEAR LAKE
AS PER DEPARTMENT OF HEALTH

Name	Location	Services: Connections	Services: Potential	Annual Water Use Million Gallons	Information Source
Nice Mutual Water Company	Nice			21,300,000	1
Lucerne Water Company	Lucerne			94,000,000	1
Kono Tayee County Maint. Dist.	Kono Tayee	40	350	5,100,000	3
Clear Lake Oaks Co. Water Dist.	Clearlake Oaks			66,500,000	1
Calif. Consolidated Water Co.	C.L. Highlands			65,000,000	2
Highlands Mutual Water Co.	C.L. Highlands			107,000,000	1
Konocti County Water District	C.L. Highlands			34,100,000	1
Mt. Konocti Mutual Water Co.	Konocti Bay	70	3,000	8,900,000	3
Clearwater Mutual Water Co.	Konocti Bay	70	255	8,900,000	3
Konocti Harbor Inn	Konocti Bay			2,200,000	4
Corinthian Bay Mutual Water Co.	Big Valley	10	76	1,300,000	3
Holiday Cove Mutual Water Co.	Big Valley	32	55	4,100,000	3
Lands End Mutual Water Co.	Big Valley	30	50	3,800,000	3
Big Valley Rancheria	Big Valley	35	75	4,500,000	3
Soda Bay Springs Mutual Water Co.	Soda Bay	20	45	2,600,000	3
Soda Bay Terrace Mutual Water Co.	Soda Bay	40	65	5,100,000	3

TABLE 2
(Continued)

Name	Location	Services: Connec-tions	Services: Poten-tial	Annual Water Use Million Gallons	Information Source
Lakeview Estates Mutual Water Co.	Soda Bay	2	70	300,000	3
Buckingham Park Water Co.	Buckingham	190	450	24,000,000	3
Riviera West Mutual Water Co.	Buckingham	10	570	1,300,000	3
Sandy Cove Water Co. (Mutual)	Buckingham	15	35	1,900,000	3
Riviera Heights Mutual	Buckingham	15	701	1,900,000	3
Crescent Bay Improvement Co.	South Highlands	9	12	1,200,000	3
Lakewood Park Mutual Water Co.	Soda Bay	23	27	2,900,000	3
		Total		467,900,000 Gal/Yr.	
		Acre Ft.		1,436 Ac.Ft./Yr.	

Explanation of Information Source

1 - Bureau of Sanitary Engineering Usage Records

2 - B.S.E. 1968 Usage Plus Factor of Increase to Present = 2.6%

3 - Estimate of present use based upon present connection, 3.5 persons per connection, and 100 Gal./Day/Person usage, per Lake County Sanitarian

4 - Estimate based on average daily population, 1966 increased by 10% for present from B.S.E. and 100 Gal./Day/Person usage.

The eastern end of the Oaks Arm is a large gently sloping area that was once a tule bog. The community of Clearlake Oaks is being built on this land, now being reclaimed by importing fill material. The famed Sulphur Bank Mine, which is located on the southeastern shore of this arm, can easily be recognized by the large mounds of tailing wastes that surround it, or by the smell of sulfur that sometimes pervades the air. On cold mornings, plumes of steam rise from the hot water or steam wells that have been drilled on the property.

The Lower Arm is the lake's outlet to Cache Creek, which begins just south of Indian Island. This arm is irregular, with the axis of the arm trending in a northwest-southeast direction. The north end of this arm is deepest; its bottom slopes upward to the shallow outlet at Cache Creek.

The Lower Arm varies from the steep shoreline caused by volcanic deposits of Mount Konocti to an alluvial plain or valley in the Burns Valley area where the community of Clearlake Highlands has developed.

The lake is not fed by perennial streams. Its level is determined by runoff from precipitation and by an impounding dam that was constructed on the Cache Creek outlet in 1915 by the Yolo Water and Power Company. The purpose of the dam is to retain winter runoff for release downstream to Yolo County during the irrigation season, and is operated under the Gopcevic Decree, a court decree that allows the lake to fluctuate between zero and a plus 7.56 feet in elevation based on an established reference plane referred to as the "Rumsey Gage".

This fluctuation occurs mostly during the irrigation season, starting out at the maximum 7-1/2 feet at the beginning of the season and dropping to near zero in September. Within these limits, the lake has a storage capacity of about 314,000 acre-feet. The natural level of the lake is approximately 3-1/2 feet below zero on the Rumsey gage.

A summary of the surface area, volume, average depth, and shoreline of each arm is included in Table 3.

Area-capacity data has been computed for Clear Lake and is included as Table 4.

TABLE 3

DATA SUMMARY FOR CLEAR LAKE

Dimensions	Clear Lake	Upper Arm	Oaks Arm	Lower Arm
Surface area, in square miles	68.5 1/	49.2	4.8	14.5.
Surface area, in acres	43,800	31,500	3,100	9,200
Percent of total	100	72	7	21
Average depth, in feet	26	23.2	36.5	33.8
Maximum depth, in feet	60±	30±	60±	60±
Shoreline in miles	71	35	12	24
Percent of total	100	50	17	33
Storage capacity, in acre-feet 2/	1,153,000	730,400	111,400	311,200
Percent of total	100	63	10	27

1/ When lake at 7.5 feet on Rumsey gage.

2/ Obtained by planimetering contours from U. S. Coast and Geodetic Survey hydrographic map of Clear Lake, dated January 1949.

Lake Inflow

There are four sources of inflow to Clear Lake: (1) precipitation directly on the lake, (2) runoff from precipitation, (3) subsurface inflow from ground water, and (4) irrigation return flow.

Precipitation directly on the lake and runoff from precipitation are the only significant sources of inflow. Records for Lakeport and Clearlake Highlands, precipitation contributes approximately 85,000 acre-feet of water per year directly to the lake.

The estimated average yearly net supply to Clear Lake has been calculated as 408,000 acre-feet based on monthly figures for 50 years of data (1911 to 1960). More than 70 percent of the total drainage area contributing this supply is tributary to the Upper Arm of the lake and is drained by four major streams (Kelsey Creek, Adobe Creek, Scotts Creek, and Middle Creek) and a number of minor ones.

Gaging stations have been established on the four major streams that measure the runoff from approximately 155 square miles of drainage area (30 percent of the total lake drainage area). Data from these stations

TABLE 4

AREA-CAPACITY DATA FOR CLEAR LAKE

Stage referred to Rumsey datum, ft.	Elevation U.S.G.S. datum, in feet	Surface area, in acres	Storage Capacity below elevation, in acre-feet
-50	1,268.64	60	1,900
-45	1,273.64	700	1,900
-40	1,278.64	2,190	9,100
-35	1,283.64	3,630	24,000
-30	1,288.64	6,520	49,000
-25	1,293.64	15,450	104,000
-20	1,298.64	21,900	197,000
-15	1,303.64	27,720	321,000
-10	1,308.64	33,790	476,000
- 5	1,313.64	36,840	652,000
0	1,318.64	39,170	842,000
+ 1	1,319.64	40,110	882,000
+ 2	1,320.64	40,630	922,000
+ 3	1,321.64	41,050	964,000
+ 4	1,322.64	41,300	1,005,000
+ 5	1,323.64	41,830	1,046,000
+ 6	1,324.64	42,660	1,088,000
+ 7	1,325.64	43,400	1,131,000
+ 8	1,326.64	44,090	1,175,000
+ 9	1,327.64	44,600	1,220,000

Notes:

1. Storage capacities between elevation 0 and elevation minus 50 feet were obtained by planimetering U. S. Coast and Geodetic Survey hydrographic map of Clear Lake, dated January 1949, scale 1:31,250, 5-foot contour interval.

2. Storage capacities between elevation 0 and elevation plus 9.0 feet were obtained from the table in U.S.G.S. Water Supply Paper No. 45 based on a map of Clear Lake in 1889 by Wm. Ham Hall.

3. Surface area from the 1949 map at elevation 0 is 39,167 acres as compared to 39,600 acres from the 1889 map; a variance of about one percent.

4. An independent check made by planimetering a controlled photo mosaic, scale 1-inch equals 1,000 feet, of Clear Lake dated May 15, 1958, with lake gage at 7.44 feet, showed the surface area at that level to be 43,950 acres.

5. The checks on surface area at elevations 0 and 7.44 feet substantiate the 1889 data as essentially correct.

show that these four main stream systems contribute approximately 45 to 50 percent of the total inflow to the lake.

Though some extensive geologic formations surrounding the lake contain ground water, there is no evidence to show that water from these formations feed the lake significantly. Either the aquifers do not extend under the lake, or the thickness of the sediments of the lake bottom prevents any large scale interchange.

A number of springs flow into the lake in the area from Soda Bay to Konocti Bay. The water coming from these springs is warm and highly mineralized, but its influence on the quality of the lake is not noticable, indicating low quantities of inflow. Although springs appear to be bubbling up in numerous places throughout the lake, they are actually gas vents that do not bring water into the lake.

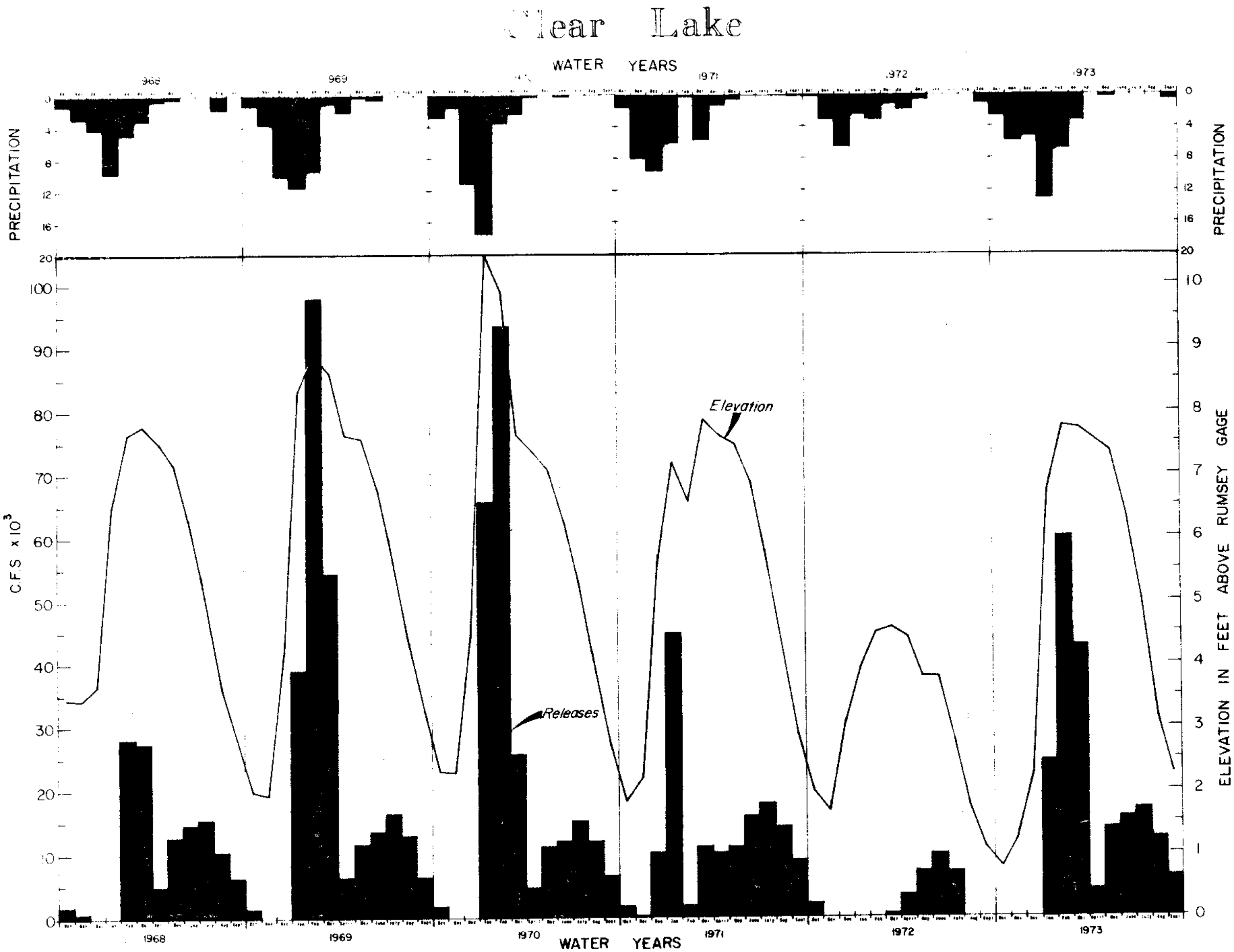
Reclamation districts created near the Upper Lake area to reclaim low lying land adjacent to Rodman Slough pump all of their irrigation return flow and drainage water to the lake. These return waters are a minor portion of the total inflow to the lake. No measurable drainage flows have been observed coming from Big Valley and Scott Valley.

Accurate inflow figures for Clear Lake are not available as all inflow has not been measured. However, to show the response of the lake level to runoff, monthly precipitation, releases, and lake level data for 1968 through 1973 are shown in Figure 5.

Lake Outflow

Though Clear Lake is a natural lake created by a volcanic dike called Grigsby Riffle, several dams have been built across the Cache Creek outlet to Clear Lake to utilize the surplus water from winter runoffs. These dams have been a source of lengthy litigation. One, constructed in 1866, was destroyed by residents along the lakeshore when rising waters inundated their lands. In 1915, the Yolo Water and Power Company, predecessor to the present owner, the Clear Lake Water Company, constructed the present impounding dam. This dam is capable of regulating water in the lake from an elevation of -3.5 to +10.3 feet on the Rumsey gage.

The rgulation of the lake levels by this dam was contested by lakeshore property owners soon after the dam was placed in operation.



CLEAR LAKE MONTHLY WATER ELEVATIONS,
RELEASES AND AREA PRECIPITATION - 1968-1973

Figure 5

In 1919, the owners of the dam tried to improve the outflow conditions from the lake by deepening the outlet channel. Work had been completed for a distance of about two miles when it was stopped by an injunction initiated by the land owners around the lake. As a result of this injunction, a decree was entered in 1920 by the Superior Court of the State of California. The salient points of the decree, known as the Gopcevic Decree, are as follows:

1. The owner and operator of the dam is perpetually enjoined from excavating the outlet of Clear Lake to any depth greater than four feet below zero on the Rumsey gage.

2. The owner and operator of the dam, in their operation of the dam, is perpetually enjoined from drawing the level of the lake below zero elevation on the Rumsey gage and cannot draw off from the lake an amount inclusive of evaporation that will cause the elevation to drop below or be less than the following percentages of the actual lake level on April 15 of each year; May 1, 97 percent, June 1, 89 percent, July 1, 79 percent, August 1, 69 percent, and September 1, 59 percent.

3. The owner and operator of the dam is perpetually enjoined in the operation of the dam from allowing the lake level to rise above 7.56 feet above zero on the Rumsey gage except during storms and floods, which period shall not exceed ten days, but in no event, over 9.0 feet above zero on the said gage.

4. If the injunction is violated, or if the owner ceases to operate the dam, the land owners around the lake are entitled to restore the natural rim of the lake (Grigsby Riffle) to either one or two feet above zero on the Rumsey gage, in accordance with certain specified conditions.

The water storage available between zero and 7.56 feet on the Rumsey gage is approximately 314,000 acre-feet. The lake has been operated to make available this storage in accordance with the terms of this decree, so far as possible; however, from 1920 through 1972, the lake level has exceeded the 9.0 elevation during seven different years. Water elevations above 9.0 feet causes flooding of lands around the lake.

The flooding is caused primarily by the restricted outlet channel which has a flood discharge capacity of only 5,000 cfs. Historic flood inflows to the lake have been measured in excess of 40,000 cfs. In February, March and April of 1958, inflows caused the elevation of Clear Lake to reach a maximum of 10.88 feet, and elevations exceeded 9.0 foot mark for 28 consecutive days, though the maximum possible controlled release was being made from the lake. With the restrictions on outflow and the large volumes of inflow, it is physically impossible to operate with the limits set by the Gopcevic Decree.

In 1938, the Clear Lake Water Company joined with Lake County and the State of California Department of Public Works to enlarge or widen the outlet of Clear Lake. This would have allowed larger releases of water while conforming to the Gopcevic Decree. Work had not progressed far when downstream land owners, fearful of flood damage from increased releases to Cache Creek from Clear Lake, obtained an injunction and a court decree that perpetually enjoins the defendants from widening, deepening, or enlarging the outlet of Clear Lake so as to increase the flow of water from Clear Lake into Cache Creek. This decision is known as the Bemmerly Decree.

The result of these decrees was to limit the amount of water available in Cache Creek below the dam and to limit the flow of this water to the present capacity of the outlet channel.

Over the past 72 years, outflows from Clear Lake have been measured, computed, and published by several agencies. During many of these years, two and even three agencies were simultaneously involved in computing Clear Lake outflows. The published figures do not agree for many of the months of common record.

From January 1, 1901 to November 14, 1915, outflows from Clear Lake were measured by the USGS and published in its Water Supply Papers.

In 1914, construction of the present concrete dam at the outlet of Clear Lake was completed. The Yolo Water and Power Company began releases of impounded water for irrigation in 1916. The company installed a staff gage downstream from the dam, and rated the gage by computing releases from the dam at various openings of the outlet gates. Accordingly from June 1, 1916, the Yolo Water and Power Company (which in 1927 was taken over by the Clear Lake Water Company) has recorded outflows from Clear Lake as measured on this staff gage.

In May 1914, the U. S. Bureau of Reclamation installed a water-level stage recorder not far from the Clear Lake Water Company's staff gage. After rating the recorder, the Bureau of Reclamation recomputed releases from the dam during the period 1916-1941 by correlating its recorder with the Clear Lake Water Company staff gage. The Bureau of Reclamation maintained the recorder and kept outflow records through April 1944.

In May 1944, the U. S. Geological Survey took over operation of the water stage recorder and has published runoff figures from then to date in the Water Supply Papers. Outflow records for 1967-68 through 1972-73 which were obtained from the USGS Water Supply Papers are shown in Table 5.

TABLE 5

TOTAL MONTHLY DISCHARGE FROM CLEAR LAKE (AF)

	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73
October	3,470	3,050	3,430	3,300	4,500	170
November	1,490	120	200	500	120	170
December	150	135	200	20,400	150	70
January	140	78,800	130,700	87,400	130	49,000
February	55,700	194,600	185,500	3,800	160	118,600
March	54,400	108,300	51,050	22,200	940	84,900
April	10,150	12,900	9,300	20,400	7,000	8,550
May	25,400	23,000	22,000	22,000	14,700	27,700
June	29,100	27,100	24,350	31,700	19,650	31,300
July	30,800	32,600	29,900	39,600	14,000	33,400
August	20,600	26,000	24,100	28,300	180	24,900
September	12,100	13,200	13,250	18,000	230	12,750

23000

<u>Lake Evaporation</u>

There is no known record of measurement of evaporation directly from the lake, and there are little reliable data from within the Clear Lake Basin upon which to base evaporation estimates for the lake.

Since the early 1960's, fragmentary climatic data have been collected in the Clear Lake region from two private cooperator stations located in "backyards" at Lakeport and Finley. The accuracy of both evaporation data from standard Class A evaporation pans and wind data from the anemometers at these sites is questionable for a number of reasons; one reason is the proximity of the stations to very tall trees and other obstructions. Use of the evaporation data from these fragmentary pan records in the Clear Lake Basin produced one estimate of the average annual lake evaporation at about 3.5 feet per year. The use of an evaporation rate this low in a hydrologic balance equation leads to numerous months of negative supplies to the lake - negatives too large to be explained.

The method most commonly used for estimating evaporation at Clear Lake in the past has been to adjust the long-term pan evaporation records from East Park Reservoir, using a pan factor of 1.00 (Department's Bulletin No. 90). Average annual evaporation from the pan at the present location is about 6.5 feet, which is typical of a dryland pan in the semiarid environment of Sacramento Valley. Applying the rule-of-thumb pan factor of 0.7, the estimated lake evaporation from Clear Lake is about 4.5 feet. The use of 4.5 feet of annual evaporation in the hydrologic balance equation leads to very few calculated negative inflows. The magnitude of these negative inflows is within the limits of error that could be expected with the methods and data used. Table 6 shows the distribution of the 4.5 feet on a monthly schedule based on the East Park evaporation pan records for the period 1911-1965.

In order to obtain reliable evaporation data and to quantify any potential inaccuracies in the cooperator climate data, three temporary well-exposed climate stations were installed by the Department during November 1970. These stations were strategically located on the north, west, and south of Clear Lake to define the magnitude of climatic variability to which the lake and its perimeter is exposed.

The station located to the north of Clear Lake, named Upper Lake-ISE, was located within a well-exposed, border-irrigated, mixed-pasture environment. Instrumentation included a standard Class A evaporation pan and water supply tank with (1) automatic pan water inflow device and

TABLE 6

CALCULATED MONTHLY DISTRIBUTION OF
EVAPORATION FROM CLEAR LAKE

Month	Percent	Evaporation (feet)
October	7.35	.33
November	3.68	.17
December	2.06	.09
January	1.87	.08
February	2.53	.11
March	4.81	.22
April	7.24	.33
May	11.20	.50
June	14.15	.64
July	17.30	.78
August	15.85	.71
September	11.96	.54
	100.00	4.50

totalizing anemometer at pan level, (2) a continuously recording anemometer and continuously recording dry bulb and wet bulb air temperature instrument installed at 2-meter height, (3) a standard 8-inch precipitation gage, and (4) a continuously recording pyranograph (recording direct and diffused incoming solar radiation). Pasture field grasses were allowed to grow to a height of about 3 feet during June before they were mowed. The fenced station enclosure and immediate outside perimeter were kept mowed at all times so that vegetation did not grow above 6 inches.

The station on the west side of the lake, named Finley-2SW, was located in a well-exposed dryland annual grass environment at the Lake County airport south of Lakeport. Station instrumentation included a standard Class A evaporation pan with water supply tank and automatic pan water inflow device, a totalizing anemometer at pan level, and a standard 8-inch precipitation gage.

The third station, Lower Lake-1W, was located on the south end of the lake, approximately 1/4 mile west of Lower Lake. The station is located within a well exposed primarily dryland annual grass environment. This climate station instrumentation included a standard Class A evaporation pan and water supply tank with automatic pan water inflow device, a standard 8-inch precipitation gage, and an anemometer over the pan.

A comparison of evaporation data (E_p) from the three DWR Clear Lake sites are shown in Figure 6. Also shown are data from the U. S. Army Corps of Engineer's dryland station on Coyote Dam at Lake Mendocino (Ukiah-4NNE), a station known to produce reliable data. These data show that the Finley-2SW 1971 monthly E_p rates are similar to 1971 Ukiah-4NNE monthly E_p rates. Both of these stations were located in a dryland environment.

Data from evaporation pans on land sites cannot be directly applied to lake evaporation because evaporation pans on land take in energy from all directions, whereas lakes primarily receive their energy via the water surface. For this reason, pan evaporation generally greatly exceeds actual lake evaporation (E_L).

Since the early 1900's, many researchers have attempted to correlate daily, monthly, and annual E_L with several individual climatological indices. They have determined that net solar radiation is the best single index for estimating evaporation as most of the energy used for evaporation is obtained directly from solar radiation.

Several empirical equations have been developed that appear to be highly valid. One such equation is known as the Kohler E_L equation. The equation was developed by the National Weather Service (Dr. Max A. Kohler et al), and uses input that consists of (1) daily solar radiation (Langleys), (2) daily mean air temperature (°F), (3) daily mean dew point temperature (°F) and, (4) wind in total miles per day at Class A pan level. Studies have shown that the accuracy of this equation allows calculation of actual lake evaporation with ± 5 percent.

The Kohler equation was used to estimate the actual evaporation from Clear Lake. As stated previously, the only weather station with the necessary instruments to measure these inputs to the Kohler equation was the Upper Lake-1SE. Data collected from this station during 1971, the lake evaporation as estimated by the Kohler equation, and the lake evaporation to pan evaporation coefficient are presented in Table 7.

EVAPORATION

FROM STANDARD CLASS A EVAPORATION PANS

Accumulated Monthly Evaporation in Inches

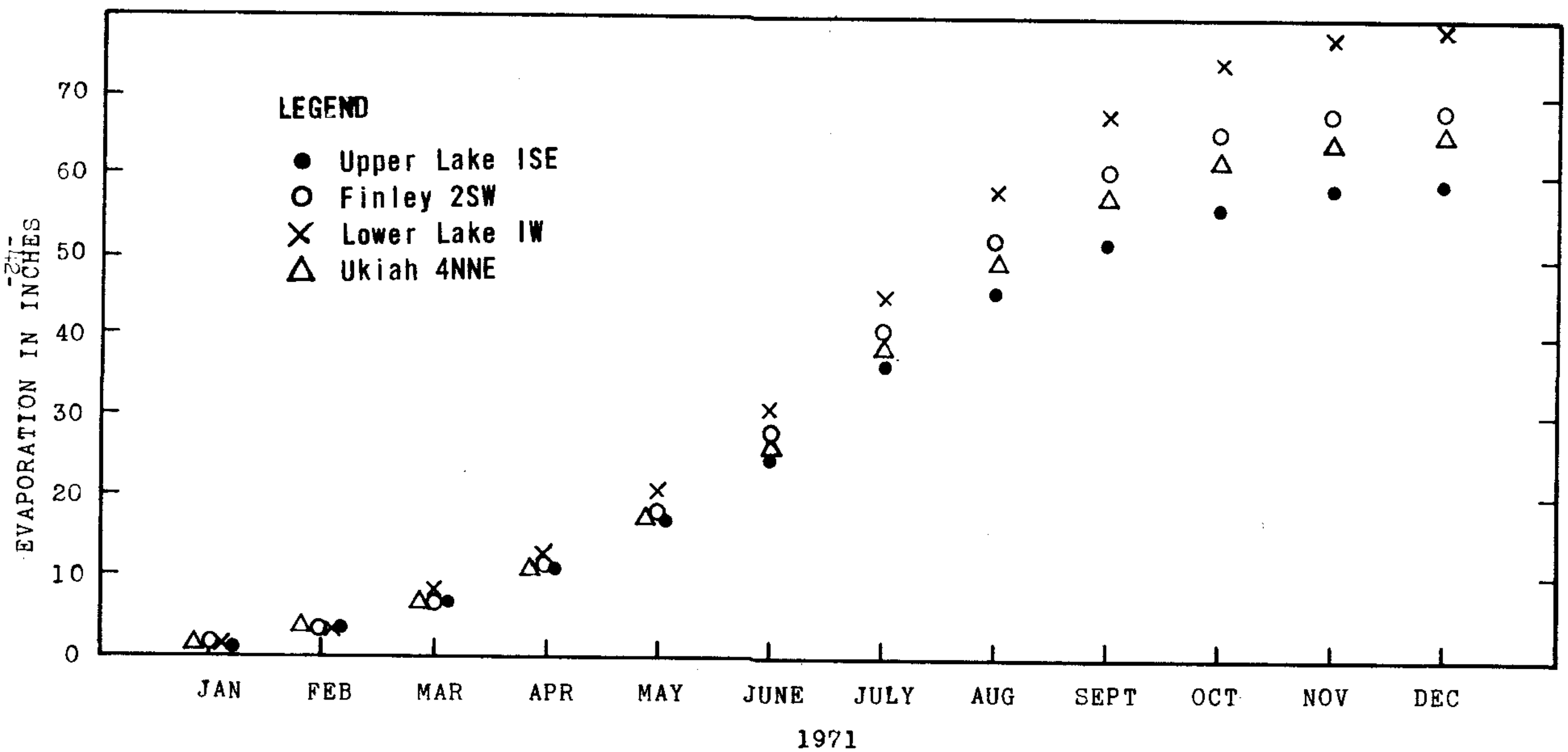


Figure 6

TABLE 7

SUMMARY OF DATA FROM
UPPER LAKE-1SE, MASTER AGROCLIMATIC STATION 1/

1971

Month	Pptn. 2/ (Inches)	Vegetation Average Cover %	Vegetation Average Height (Inches)	Temperature 3/ Mean Daily °F Air	Temperature 3/ Mean Daily °F Dew Point	Wind 4/ (Miles)	Solar Radiation 5/ (Langley's)	E_p Measured Upper Lake 1SE (Inches)	E_L Computed Kohler (Inches)	$\frac{E_L}{E_p}$ Coeff.
Jan.	5.89	80	4	-	-	576	7073	1.04	1.12	1.08
Feb.	0.25	90	4	44	32	1118	10389	2.31	1.96	.85
Mar.	5.31	95	5	45	35	1036	12622	2.81	2.44	.87
Apr.	1.32	90	4	49	39	1266	17139	4.48	3.89	.87
May	0.74	90	4	55	43	1037	18408	6.10	4.83	.79
Jun.	0.00	75	4	64	46	1211	21160	9.09	6.67	.73
Jul.	0.00	90	5	71	54	921	22879	10.20	7.61	.75
Aug.	0.12	90	4	68	52	945	20963	9.33	6.65	.71
Sep.	0.30	90	4	62	45	966	16776	6.41	4.81	.75
Oct.	0.77	90	4	54	38	882	12969	4.22	3.12	.74
Nov.	3.22	70	4	45	33	840	7670	2.14	1.36	.64
Dec.	5.98	50	4	34	17	1222	5953	0.78	1.25	1.60
Total	23.90					12020	174001	58.91	45.71	.78

1/ Station elevation 1,330 feet above m.s.l.; one annual hay crop usually mowed during June; station grasses kept mowed to 3-5-inch height; border flood irrigation used.

2/ Measured by nonrecording 20-inch capacity standard 8-inch precipitation gage; funnel removed during winter for snow catch; light viscosity oil used in gage.

3/ Continuously recorded at 2-meter height.

4/ 4.4-inch diameter aluminum cupped anemometer at 6-inch height above standard Class A pan rim.

5/ Total incoming (direct and diffuse) received on a horizontal bimetal plate; continuously recorded by pyranograph.

Because the E_p rates for the Ukiah-4NNE station and the Finley-2SW station show good consistent relationship, the historical data from the Ukiah-4NNE station were used to estimate the average annual E_p for the Finley location for the 12 year period 1960-71.

The dryland-wetland E_p ratio for the Finley and Upper Lake stations appeared to be consistent, thus the estimated long term Finley data were used to estimate the average annual E_p for Upper Lake for the 1960-71 period.

The E_p data show that evaporation at the Lower Lake station is approximately 15 percent greater than at the Finley station. This greater E_p also indicates that lake evaporation is greater in the Lower Arm of the lake. To estimate evaporation from the Lower Arm of the lake, Lower Lake E_p was converted to E_L, using the Finley E_L/E_p coefficient. The resultant estimated 1971 annual E_L and the 1960-71 extrapolated data for the three areas are presented in Table 8.

Using the estimated E_L values shown in Table 8, the weighted average yearly evaporation value for the entire lake for the 1960-71 period was computed to be 49.1 inches. This average yearly evaporation figure was derived by assuming that the Upper Arm of the lake has 70 percent of the surface area and the two lower arms the remaining 30 percent.

TABLE 8

MEASURED PAN EVAPORATION AND ESTIMATED LAKE EVAPORATION AT 3 LOCATIONS AROUND CLEAR LAKE

Station		1971	1960-71
Ukiah	E_p	65.2	67.1
Upper Lake	E_p	58.9	60.6
	E_L	45.7	47.0
Finley	E_p	68.1	70.1
	E_L	45.7	47.0
Lower Lake	E_p	78.4	80.7
	E_L	52.5	54.0

Wind

A comparison of wind data collected in 1971 at five measuring stations, four of them in the vicinity of Clear Lake, is shown in Figure 7. These data are reported as the monthly accumulated daily average of miles of wind passing a totalizing anemometer located at pan height.

The wind data indicate that the Lower Lake area receives approximately 70 percent more wind than does the Upper Lake area. This increased wind could be caused by the nearness of the hills surrounding this portion of the lake, causing increased wind velocities by air displacement.

This is more dramatically shown by the data presented in Table 9. These data, collected in 1965, were obtained from recording anemometers installed at the ends of two piers jutting into Clear Lake, one at Lakeport and the other in the "Narrows" area at Glenhaven. The anemometers were located approximately 16 feet above the water surface.

The data report the total measured miles of air passing the anemometer weekly during the late winter and spring months and also during the fall and early winter months.

The data show air movement at the "Narrows" and at the foot of Mt. Konocti has exceeded as much as five times the air movement for a comparable period at Lakeport.

—AIR MOVEMENT—
Accumulated Monthly Average Daily Wind

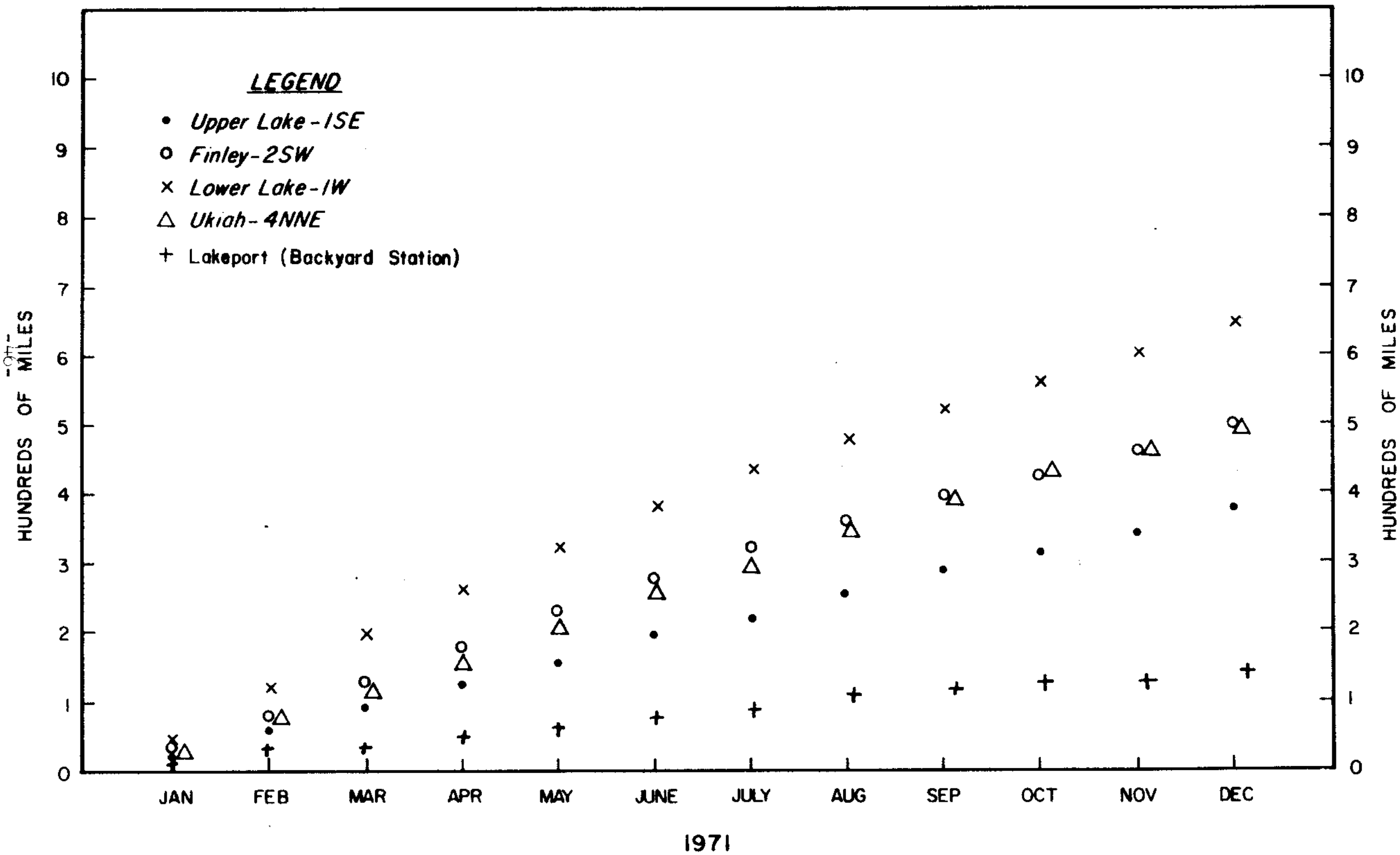


FIGURE 7

TABLE 9

TOTAL WEEKLY AIR MOVEMENT IN MILES - 1965

Date			Lakeport	Glenhaven
2-17	to	2-23	534	1058
2-24	"	3-2	732	1228
3-3	"	3-9	1133	1353
3-10	"	3-16	906	1581
3-17	"	3-23	614	1953
3-24	"	3-31	-	1789
4-1	"	4-8	-	2130
4-9	"	4-14	1472	1879
4-15	"	4-21	-	1373
4-22	"	4-28	398	-
4-29	"	5-5	613	2612
5-6	"	5-12	447	1292
5-13	"	5-19	4555	2393
5-20	"	5-26	486	2318
5-27	"	6-2	437	1362
6-3	"	6-9	488	2157
6-10	"	6-16	528	2544
6-17	"	6-23	-	1846
6-24	"	6-30	-	1722
7-1	"	7-7	-	1385
9-21	"	9-29	421	-
9-30	"	10-8	325	-
10-9	"	10-14	-	1487
10-15	"	10-21	-	1436
10-22	"	10-28	-	713
10-29	"	11-4	-	879
11-5	"	11-11	-	1386
11-12	"	11-18	-	1246
11-19	"	11-25	319	1041
11-26	"	12-2	278	717
12-3	"	12-9	165	549
12-10	"	12-15	-	767

CHAPTER III

WATER QUALITY

This chapter contains a discussion of the water quality parameters measured in Clear Lake and the methods used in the collection and analysis of these parameters. Only the physical, chemical and biological parameters believed to be the most important were measured.

The Department has been collecting and analyzing samples of water from Clear Lake on a routine schedule since 1951. Sampling frequency has generally been monthly with the samples collected at two stations, Lakeport City pier, and at Cache Creek near Lower Lake, which is the outlet of Clear Lake below the dam.

Results of these analyses were reported yearly in the Department's Bulletin 65 series until 1963, and in Bulletin 130 series since that time. The analyses regularly included the water temperature, turbidity, dissolved oxygen pH, and electrical conductivity.

Occasionally, special analyses were run for a series of constituents such as the "standard minerals", heavy metals, nutrients, pesticides, and miscellaneous constituents. Standard mineral analyses generally included hardness, calcium, magnesium, potassium, carbonate, bicarbonate, sulfate, chloride, nitrate, boron, floride, and silica dioxide determinations.

Heavy metal analyses were generally for arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, selenium, silver, and zinc.

Nutrient analyses included nitrate and ortho phosphate remaining in the water after filtering through an 0.45 μ filter. Select samples were further analyzed for total phosphorus and organic nitrogen and ammonia.

The pesticide analyses generally determined the chlorinated hydrocarbon and organophosphate groups only. The analyses of water collected from 1964 to 1974 at the two monitoring stations on Clear Lake are included in Appendix A.

Following the Department's Clear Lake water quality investigation reported in Bulletin No. 143-2 in 1966, a special data collection program designed to define Clear Lake's limnologic and water quality system was initiated. The purpose of the data collection program was threefold:

(1) to determine the existing physical, biological, and chemical water quality conditions in the lake: (2) to gather data that could be used in helping solve the foremost problem of excessive algae growth; and (3) to supply additional data so that the previous evaluation of the effect of imported Eel River water on the water quality of Clear Lake could be refined. The data collected for this program from 1968 to 1973 are presented in this report.

In 1968 and 1969, data collection surveys were performed on the lake at 2-week intervals from April to November and at one month intervals for the remainder of the year. In 1970 and 1971, the April-to-November survey frequency was increased to every 9 days or less.

All data collection surveys were made at one representative station in each arm of the lake. The stations are shown in Figure 8. Early in the study it was noted that data obtained at Station 2 were similar to data from Station 1. To avoid duplication and reduce time and costs, data collection at Station 2 was discontinued after 1968.

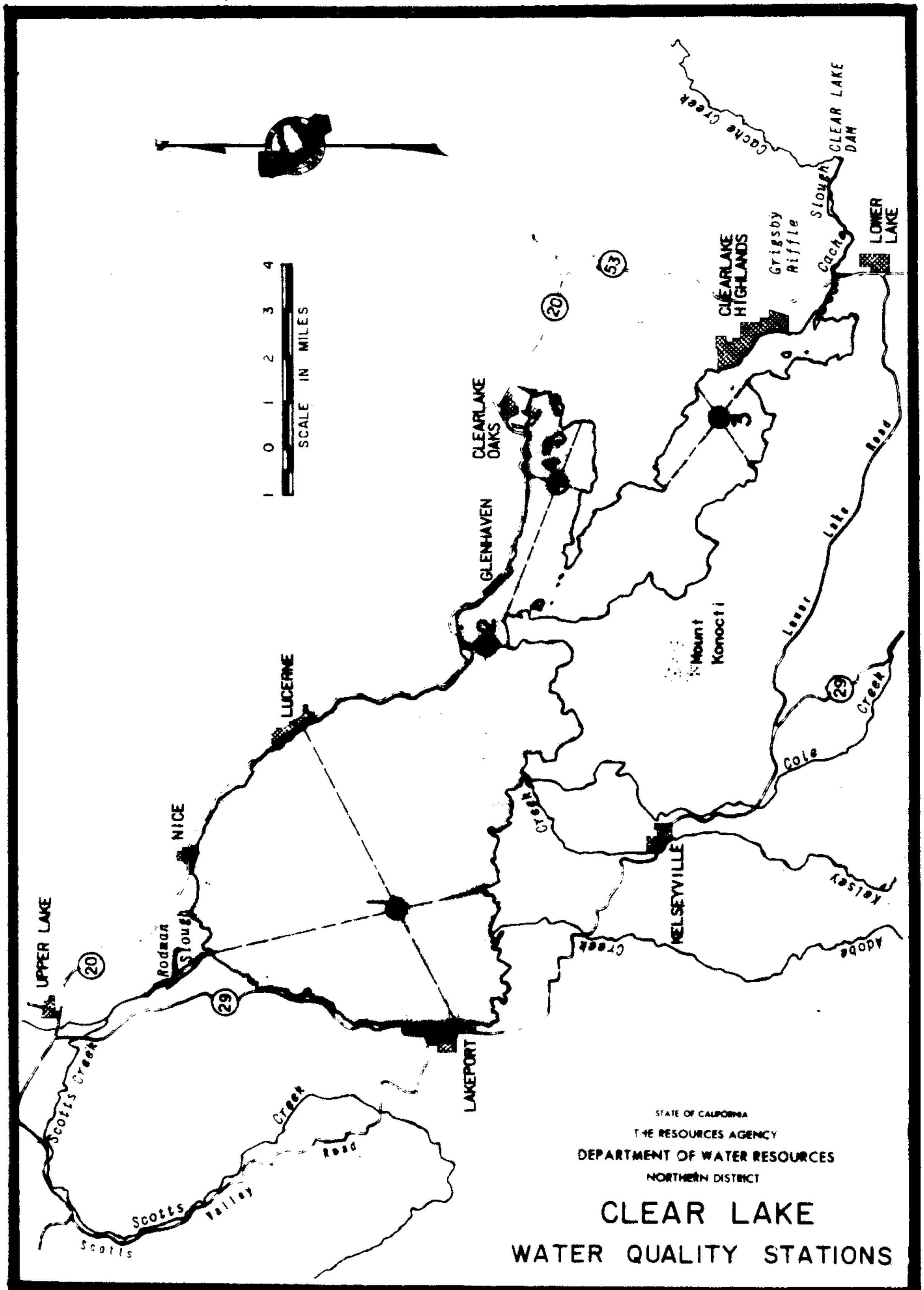
Parameters monitored regularly were temperature, pH, dissolved oxygen, turbidity, electrical conductivity, and nutrients. In addition, phytoplankton samples were collected, all predominant genera were identified and counted, and the total biomass was computed. Zooplankton samples were measured in the 1970 study. The above data are presented graphically in Appendix B.

Physical Parameters

Water temperature, secchi disc readings, and turbidity were the only physical parameters collected regularly. Miscellaneous surveys collected data on volatile suspended solids and bottom sediment gradation. Limited data were obtained on lake currents concurrent with wind direction and average wind velocity.

Water Temperature

Temperature values throughout the water column were obtained at each station during each survey using a remote-sensing thermistor. Values were obtained at one meter intervals.



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

CLEAR LAKE
WATER QUALITY STATIONS

Various makes of instruments were used, but all were calibrated against a standardized thermometer to a ± 0.5° F. through the expected temperature range.

A comparison of the average water column temperatures measured at each station throughout the year for 1968 through 1973 is shown in Figure 9.

The temperature measured in the water column is included in the graphs in Appendix B.

Turbidity Values

During the entire period of study, samples for turbidity values were collected from the surface and bottom meter of water during each survey. These were obtained by using a Van Dorn water sampling bottle approximately one meter in length. The samples were then transported to the Northern District laboratory where their turbidity values were measured using a Hach Model 1860 nephelometer. The turbidity values measured in the top meter of water at all three stations for the period of study are shown in Figure 10.

Secchi Disc Readings

A reading of the secchi disc depth was made at each station during each survey throughout the period of Study. The secchi disc used was an aluminum plate 20 cm in diameter with alternate black and white quadrants.

Values of the secchi disc readings are plotted on the graphs in Appendix B.

Lake Sediments

A special study was made on the gradation of the lake sediments. A grain size analysis was made on two sediment cores obtained in the upper arm of Clear Lake by the U. S. Geological Survey. One core, 5-feet long, was collected near Department of Water Resources Station 1. The other, 2-feet long, was collected approximately 1.5 miles south of Station 1, and approximately 1.0 mile west of Long Tule Point.

Gradation and percent organic content were determined for each 1-foot section of the 5-foot core and for the entire section of the 2-foot core. Gradation was determined by both the hydrometer and mechanical

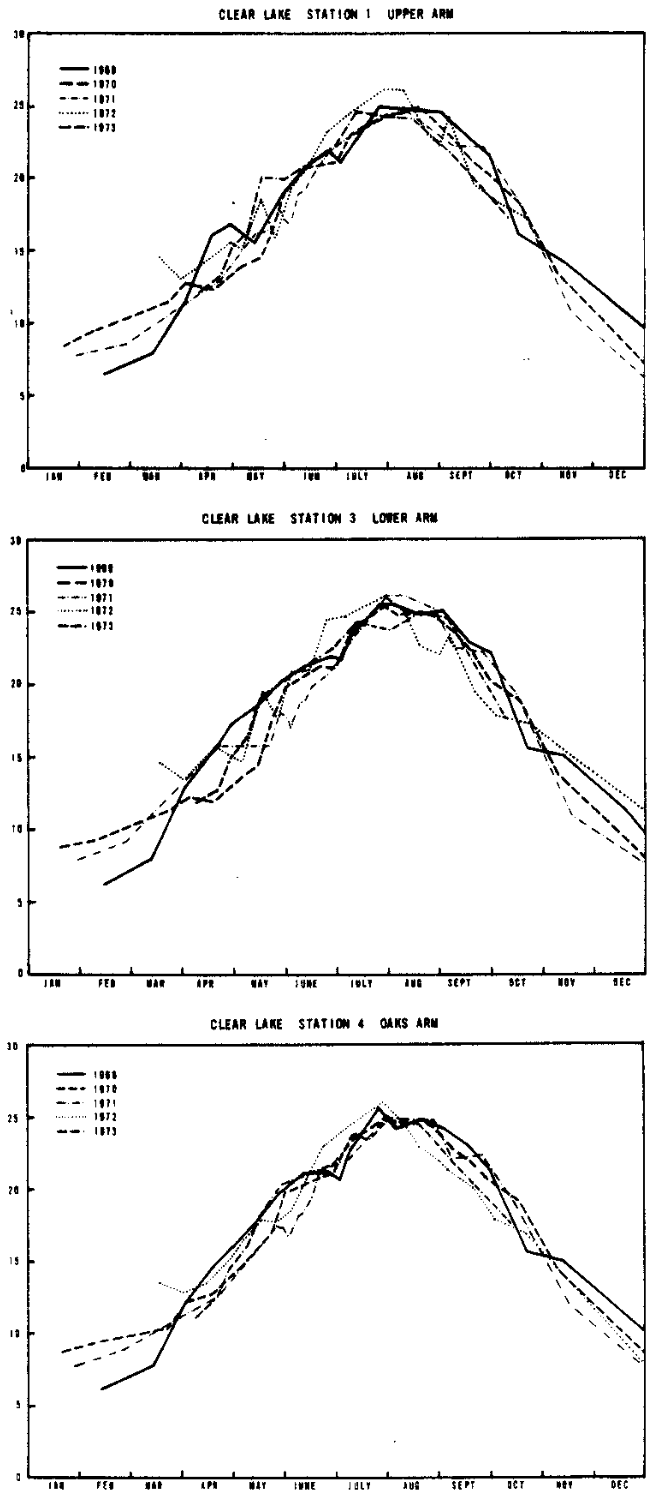


FIGURE 9 COMPARISON OF AVERAGE WATER COLUMN TEMPERATURES

CLEAR LAKE

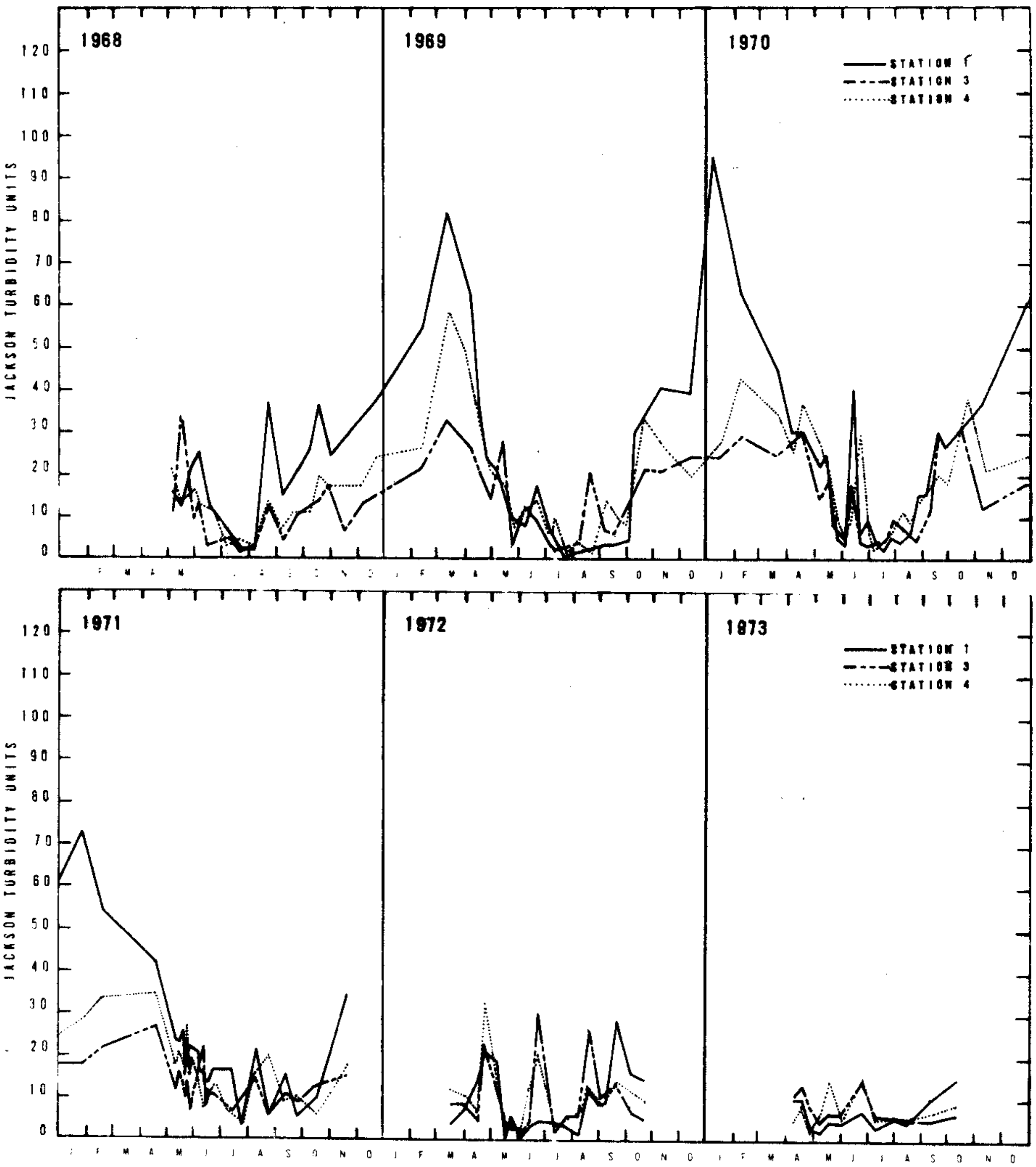


FIG 10 TURBIDITY VALUES MEASURED IN TOP METER OF WATER 1968-73

methods in the Department's Soil Laboratory following standard soil test procedures outlined in the Department's soil testing manual. This information is presented in Table 10.

TABLE 10

CLEAR LAKE SEDIMENT SAMPLES CLASSIFICATION TEST SUMMARY

MAY 1969

Location			Gradation Analysis - % Finer										React to HCl	Org. %
Sta. No.	Depth Range in Feet		Sand						Silt & Clay					
			4	8	16	30	50	100	200	5 M	2 M	1 M		
1	0	1	100	98	95	93	92	89	80	27	15	10	No	18.9
1	1	2	100	94	86	83	81	76	60	31	19	13	No	19.2
1	2	3	100	97	89	85	81	75	61	22	12	8	No	20.6
1	3	4	100	97	88	83	80	72	56	25	15	11	No	21.5
1	4	5	100	98	97	96	94	80	64	47	33	23	No	18.1
1A	0	2	100	96	91	87	83	78	67	33	23	16	No	17.4

The percent of organic content in the sediments was obtained by placing 10-20 gram samples of oven-dried material that had passed a 4.76 mm opening in a preheated furnace at 550° C ± 5.0° for one hour, removing and placing it in a drying oven for five minutes, then removing the material and weighing. This cycle was repeated until the change in weight was less than 0.01 gm. Organic content was then determined by the following formula:

$$\text{Organic Content } (\%) = \frac{(\text{Wt of oven dried soil}) - (\text{Wt burned soil}) \times 100}{\text{Wt of oven dried soil}}$$

All of the loss on heating may not necessarily be due to organic material present in the sediments because $CaCO_3$ can decompose to form CaO and CO_2. However, it is believed that the major portion of weight loss is from organic material.

Total Volatile Material in Sediments

Gaonkar (August 1971) collected sediment samples from the surface of the bottom muds over a period of one year and determined their percentage of volatile matter. His method was to oven-dry a sample at 103° C. for 24 hours, and then ignite a known weight at 600° C. for 1 hour.

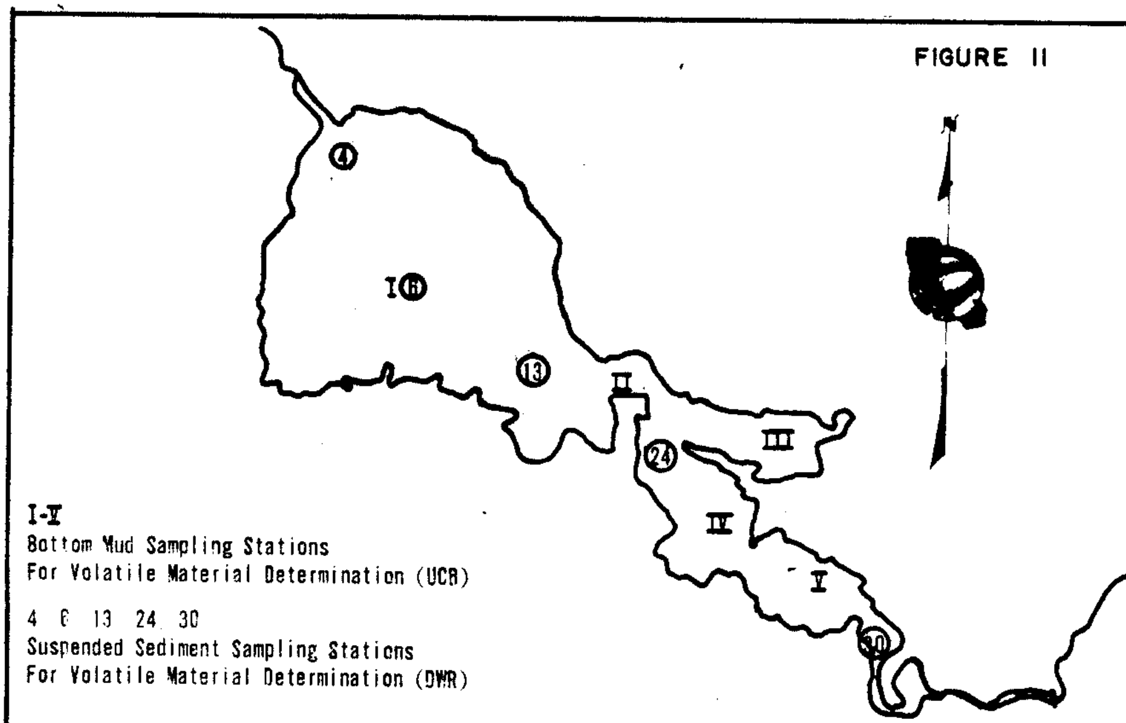
The loss in weight after ignition was used as the measure of volatile matter present in the sample. The stations where the samples were collected are shown in Figure 11. These data are presented in Table 11.

Suspended Volatile Materials

A study of the suspended solids throughout the water column was made at 5 stations on Clear Lake in 1965. The analyses were for not only the total amount of suspended solids, but also for the percentage of suspended sediments that were volatile. This percentage of volatile material was determined in the Department's laboratory, using the same standard method described in the previous section on volatile material. These data have not been presented previously.

Three surveys were made, and initially four stations were sampled, three in the Upper Arm and one at the outlet of the lake. For the second

FIGURE 11



SAMPLING STATION LOCATIONS FOR VOLATILE MATERIALS IN BOTTOM MUDS AND IN SUSPENSION

TABLE 11

TOTAL VOLATILE MATTER IN CLEAR LAKE BOTTOM MUD
1969-70 (GAONKAR 1971)

Date	Station I % T.V.M.	Station II % T.V.M.	Station III % T.V.M.	Station IV % T.V.M.	Station V % T.V.M.
12- 4-69	12.96	15.57	10.80	18.72	7.68
12-15-69	13.55	16.20	20.60	20.30	4.33
2- 4-70	12.85	16.80	16.10	19.50	7.55
2-18-70	12.45	16.55	12.18	18.20	3.62
3- 3-70	13.25	17.15	16.08	19.20	7.70
3-16-70	15.00	18.15	19.50	19.80	5.47
3-31-70	14.70	17.85	28.70	20.00	21.70
4-15-70	15.88	18.38	12.30	20.75	20.80
4-28-70	14.60	18.60	20.40	20.40	7.13
5-12-70	14.80	18.50	13.75	20.45	9.30
5-26-70	15.25	18.65	18.50	21.10	7.65
6-10-70	15.50	18.85	12.00	22.90	8.85
6-22-70	14.70	20.00	16.80	20.10	7.32
7- 2-70	14.55	17.50	9.40	19.70	20.60
7-13-70	13.95	15.45	12.15	18.60	17.55
7-24-70	14.50	14.95	14.40	19.30	8.80
8- 3-70	14.45	18.00	22.10	20.50	21.20
8-13-70	13.60	17.30	20.50	19.50	20.10
8-24-70	14.40	17.90	21.60	20.40	13.55
9- 3-70	13.60	17.70	21.30	20.70	12.35
9-14-70	14.80	18.45	22.15	19.25	21.40
9-24-70	13.75	17.70	19.50	20.00	19.80
10- 5-70	14.00	17.10	21.65	19.65	20.30
10-15-70	14.25	18.35	22.30	20.70	19.40

and third survey, a fifth station (Station 24) was added at the upper end of the Lower Arm (Station 24). These sampling locations are also shown on Figure 11 and the data are presented in Table 12.

TABLE 12

SUSPENDED VOLATILE AND NONVOLATILE SOLIDS
IN LAKE WATER

Date	Depth in Feet	Secchi Disc (feet)	Turbidity (JTU)	Suspended Solids mg/1	Volatile Suspended Solids mg/1
Clear Lake - Station 4					
10- 7-65	Surf.	0.3	45	47	17
	1.0		52	40	12
	2.0		50	44	14
	3.0		35		
	4.0		350	310	51
10-27-65	Surf.	0.2	70	44	6
	1.0		55	45	7
	2.0		68	46	7
	3.0		62	46	6
	4.0		80	64	8
11-16-65	Surf.	0.2	80	49	9
	1.0		80	49	9
	2.0		80	52	7
	3.5		112	68	8
Clear Lake - Station 6					
10- 7-65	Surf.	0.3	45	30	11
	1.0		48	35	13
	2.0		70	44	14
	3.0		68	30	19
	4.0		80	50	14
	5.0		40	76	39
	6.0		70	50	14
	7.0		80	50	13
	8.0		470	222	44
10-27-65	Surf.	0.6	18	11	2
	1.0		20	14	5
	2.0		20	12	3
	3.0		15	16	4
	4.0		25	22	4
	5.0		58	28	5
	6.0		45	28	4
	7.0		55	22	4
	8.5		95	47	0

TABLE 12
(Continued)

Date	Depth in Feet	Secchi Disc (feet)	Turbidity (JTU)	Suspended Solids mg/l	Volatile Suspended Solids mg/l
Clear Lake - Station 6 (Continued)					
11-16-65	Surf.	0.3	70	42	8
	2.0		80	48	9
	4.0		89	48	8
	6.0		90	48	8
	8.0		70	49	8
Clear Lake - Station 13					
10- 7-65	Surf.	0.4	40	24	12
	1.0		40	24	11
	2.0		28	26	11
	3.0		40	26	10
	4.0		45	29	11
	5.0		50	29	11
	6.0		70		
	8.0		70	62	16
10-27-65	Surf.	0.4	30	18	3
	1.0		22	17	2
	2.0		30	18	2
	3.0		28	18	3
	4.0		35	20	4
	5.0		30	18	4
	6.0		32	19	4
	7.0		32	22	3
	8.0		160	90	11
11-16-65	Surf.	0.2	70	47	8
	1.0		78	46	8
	2.0		72	49	9
	4.0		82	52	10
	5.0		80	48	9
	6.0		85	51	11
	7.0		80	54	11
	8.0		130	79	15
Clear Lake - Station 24					
10-27-65	Surf.	0.6	12	12	2
	1.0		20	11	2
	2.0		19	13	3
	3.0		20	14	4

TABLE 12
(Continued)

Date	Depth in Feet	Secchi Disc (feet)	Turbidity (JTU)	Suspended Solids mg/1	Volatile Suspended Solids mg/1
Clear Lake - Station 24 (Continued)					
	4.0		19	19	5
	5.0		19	20	3
	6.0		29	23	4
	7.0		32	26	4
	8.0		58	36	5
	9.0		55	48	6
11-16-65	Surf.	0.1	32	24	8
	1.0		38	26	8
	2.0		40	25	8
	3.0		43	24	8
	4.0		41	26	7
	5.0		42	28	6
	6.0		40	28	5
	7.0		42	33	9
	8.5		200	170	36
Clear Lake - Station 30					
10- 7-65	Surf.	0.4	35	26	14
	1.0		40	27	14
	2.0		40	26	14
10-27-65	Surf.	1.8	25	21	7
	1.0		25	21	6
	2.0		25	24	6
	3.0		30	24	6
	4.0		30	30	5
	4.8		60	120	19
11-16-65	Surf.	0.6	18	20	6
	1.0		15	21	9
	2.0		20	20	8
	3.0		22	20	10
	4.5		15	20	6

Lake Currents

Determining lake currents is a study unto itself. However, some current data were collected by DWR during the spring of 1965. These data have not been presented previously and are included in this report for reference.

Currents were determined by using drogues with vanes measuring one square meter in area. The drogues, adjusted to near null buoyancy, were set and maintained at the desired depth with wires suspended from a section of aluminum tubing floating at the surface. Floats were identified by numbers painted on a fluorescent flag attached to a wooden dowel placed in the top of the aluminum tube. Tracking was done visually from a boat during daylight hours only.

The paths taken by drogues set at different depths, time of travel, and wind rosettes showing average velocity and direction from which the wind was glowing in percentage of tracking time are shown in Figure 12.

Chemical Parameters

This section discusses those constituents that are or are considered to be in solution and thus affect the quality of the water.

Standard Minerals

The common or "standard" minerals generally reported in water analyses are the cations calcium, magnesium, sodium and potassium; and the anions bicarbonate, carbonate, sulfate and chloride. Colloidal constituents generally occur as silica and oxides of iron and aluminum. Lesser constituents which can be limiting factors in the usability of water for agricultural or domestic purposes are boron, fluoride, and nitrate. Table 13 presents the range of mineral constituents measured since 1951 by the Department of Water Resources at two stations on Clear Lake. The individual analyses for samples collected since May of 1968 are included in Appendix A.

The station, "Cache Creek near Lower Lake", samples the outflow of Clear Lake immediately downstream from the dam. During winter months, this station is influenced by inflow from three annual streams, Seigler, Copsey, and Herndan Creeks, that discharge between the lake proper and the dam. Analyses of samples collected at this station are also included in Appendix A.

Electrical Conductivity

Electrical Conductivity (EC) values have been determined on water samples from various stations on Clear Lake since 1951. However,

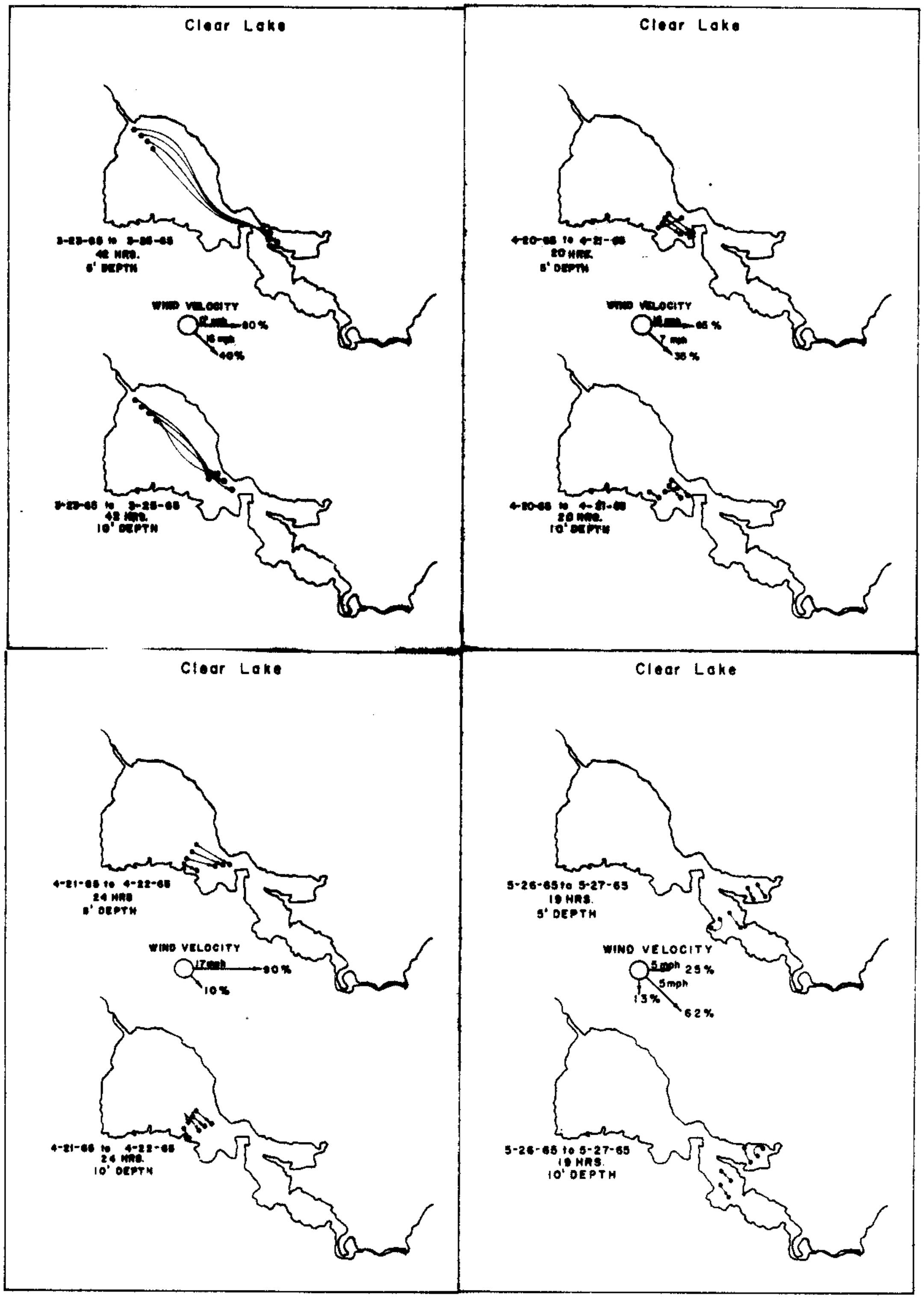


FIG 12 DIRECTION OF LAKE CURRENTS AT VARIOUS DEPTHS 1965

TABLE 13

RANGE OF MINERAL CONSTITUENTS OF CLEAR LAKE
(mg/l)

Mineral Constituents	Clear Lake At Lakeport			Cache Creek Near Lower Lake		
	High	Low	Median	High	Low	Median
Calcium	30	17	23	50	17	25
Magnesium	21	9.8	15	53	11	18
Sodium	14	4	10	56	7.2	12
Potassium	2.8	0.1	2.0	3.9	0.8	2.1
Bicarbonate	212	96	145	287	46	158
Sulfate	35	5.1	9	21	5.8	9.7
Chloride	10	3.2	6	145	3.8	8.2
Nitrate	11	0.0	1.6	13	0.0	2
Fluoride	0.4	0.0	0.1	0.3	0.0	0.1
Boron	1.2	0.1	0.7	7.4	0.1	0.9
Silica	34	0.7	14	27	0.6	9
Hardness (Total)	158	78	115	344	56	117

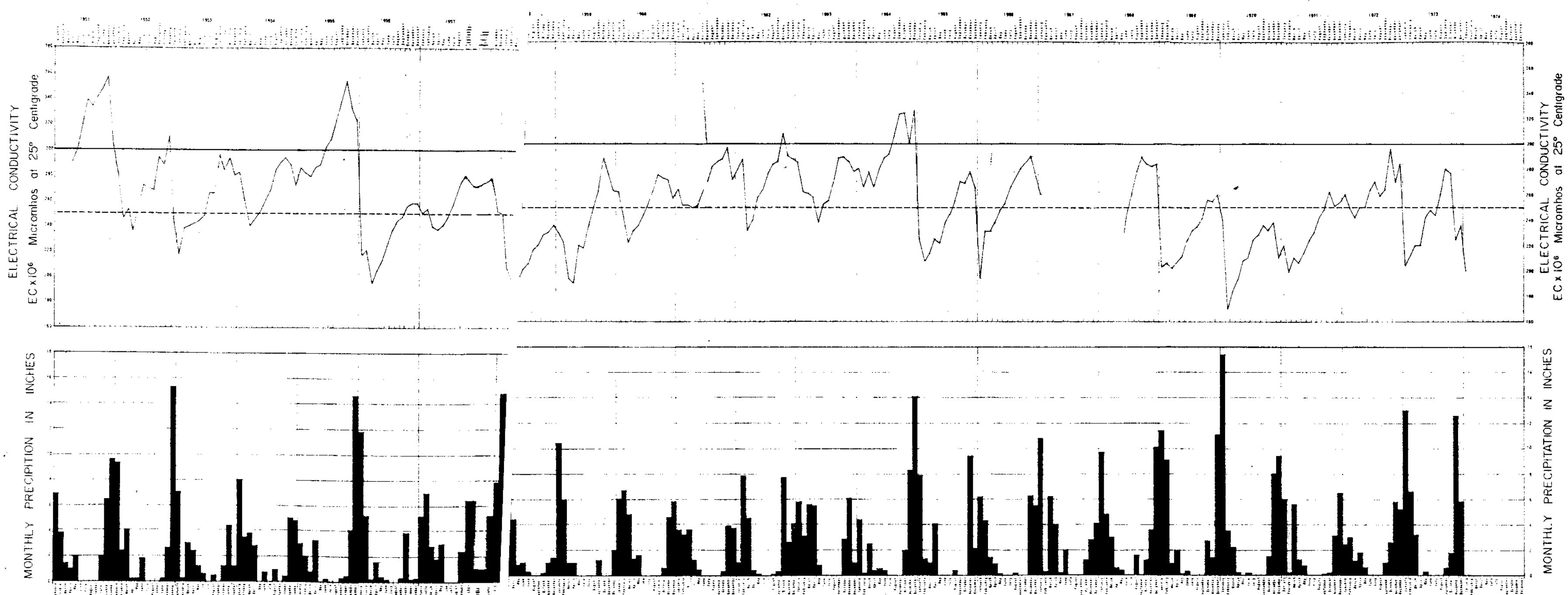
the samples collected at the Lakeport City pier are the only samples that have had their EC values determined on a continuous monthly basis. The EC values were determined with a line voltage EC bridge after the samples had been transported to the laboratory.

Figure 13 shows the variations of EC values in the Lakeport City pier samples for the 23 years of record along with the total monthly precipitation measured at Lakeport for the same time period.

During the 1963-65 study by the Department, electrical conductivity was measured at four widely separated locations periodically throughout the study. In the latter part of December 1964 and early part of January 1965, a storm caused more than 500,000 acre-feet of inflow to Clear Lake, most of which entered the upper arm. This amount of inflow was equal to about 70 percent of the amount of water in storage at the beginning of the storm period. The EC values of the water at all four stations prior to inflow were nearly equal at approximately 330 µmhos. The EC values of the inflowing water measured approximately 90 µmhos. The EC measurements

Figure 13

Clear Lake at Lakeport



at all four stations following the storm showed that the inflowing water was slow to mix with and dilute the lake water. It was almost May before the EC values at the four stations again became equalized, but at a lower EC value of approximately 220 μmhos.

These data have been presented previously in the Department's Bulletin 143-2. However, as they are significant in any study of Clear Lake, they are again presented graphically for reference in Figure 14.

Beginning in 1968, EC values were measured on discrete samples collected throughout the water column. This usually consisted of a surface, and bottom sample, plus others at 2 or 3-meter intervals, depending on the depth of water. As in previous evaluations, the samples were transmitted to the laboratory where the values were measured by a line voltage EC bridge.

The average water column EC values obtained at three stations from 1968 through 1973 are plotted in Figure 15.

pH

The pH values were measured on discrete samples collected throughout the water column with a 2-liter Van Dorn bottle. These measurements were made on the same sample that was collected for EC determinations, thus they were obtained from the surface and bottom of the water column and at 2-meter or 3-meter intervals, depending on the depth of water.

Values were measured by placing a sample in a Hellige Comparator. Indicator reagents were verified in solutions of known pH values. The pH field values were often compared with laboratory values obtained by using a glass electrode, expanded scale, pH meter.

The pH values of both the surface and bottom of the water column for each survey conducted since 1968 are shown in Figure 16.

Alkalinity

Alkalinity values were measured on the surface and bottom samples of water collected during each survey beginning in February of 1971. The determinations were made using the procedures described in the 13th edition of Standard Methods for Examination of Water and Waste Water.

Clear Lake

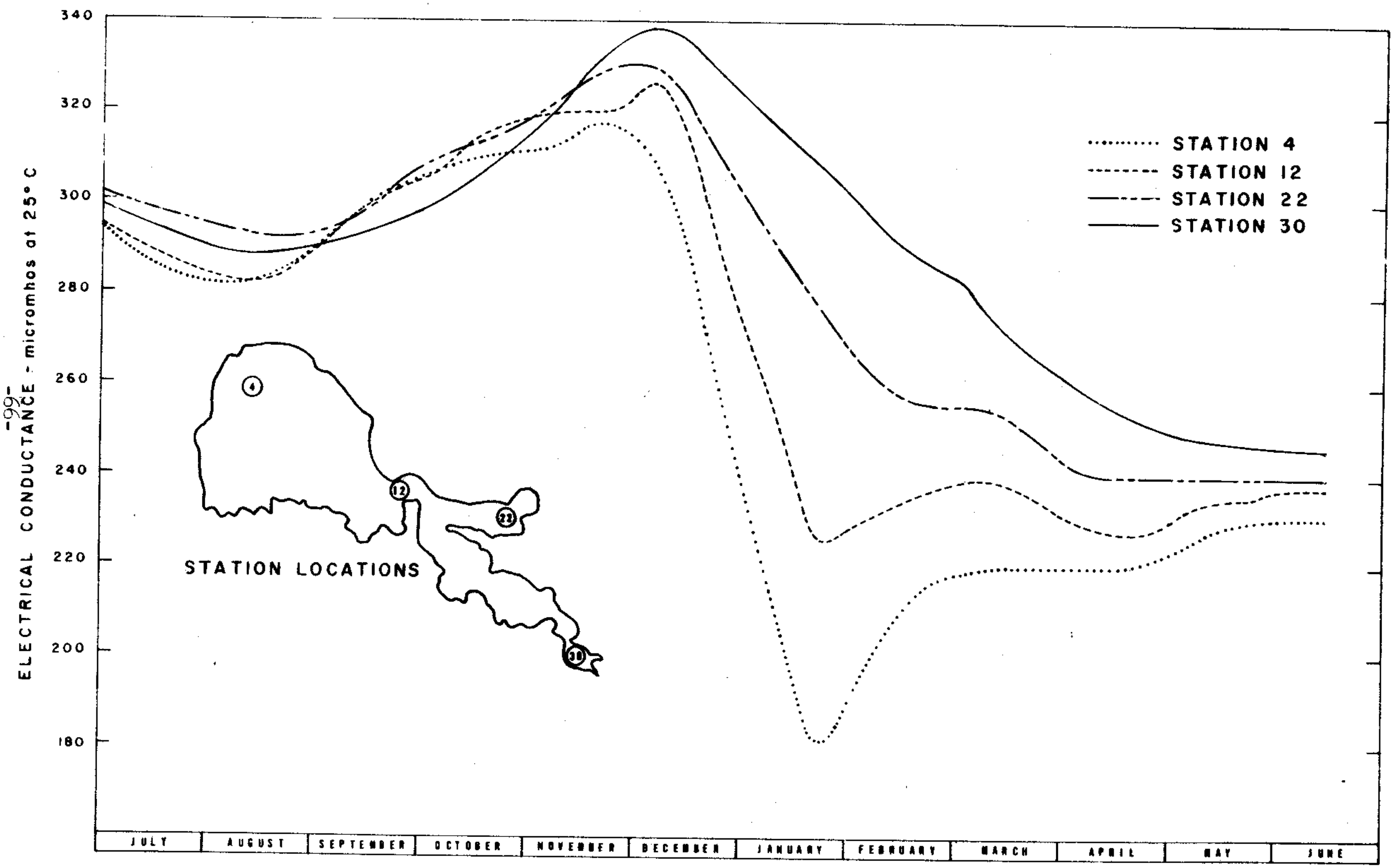


FIGURE 14 SPECIFIC ELECTRICAL CONDUCTANCE (EC) VALUES AT FOUR SELECTED STATIONS FROM JULY 1964 TO JUNE 1965

CLEAR LAKE

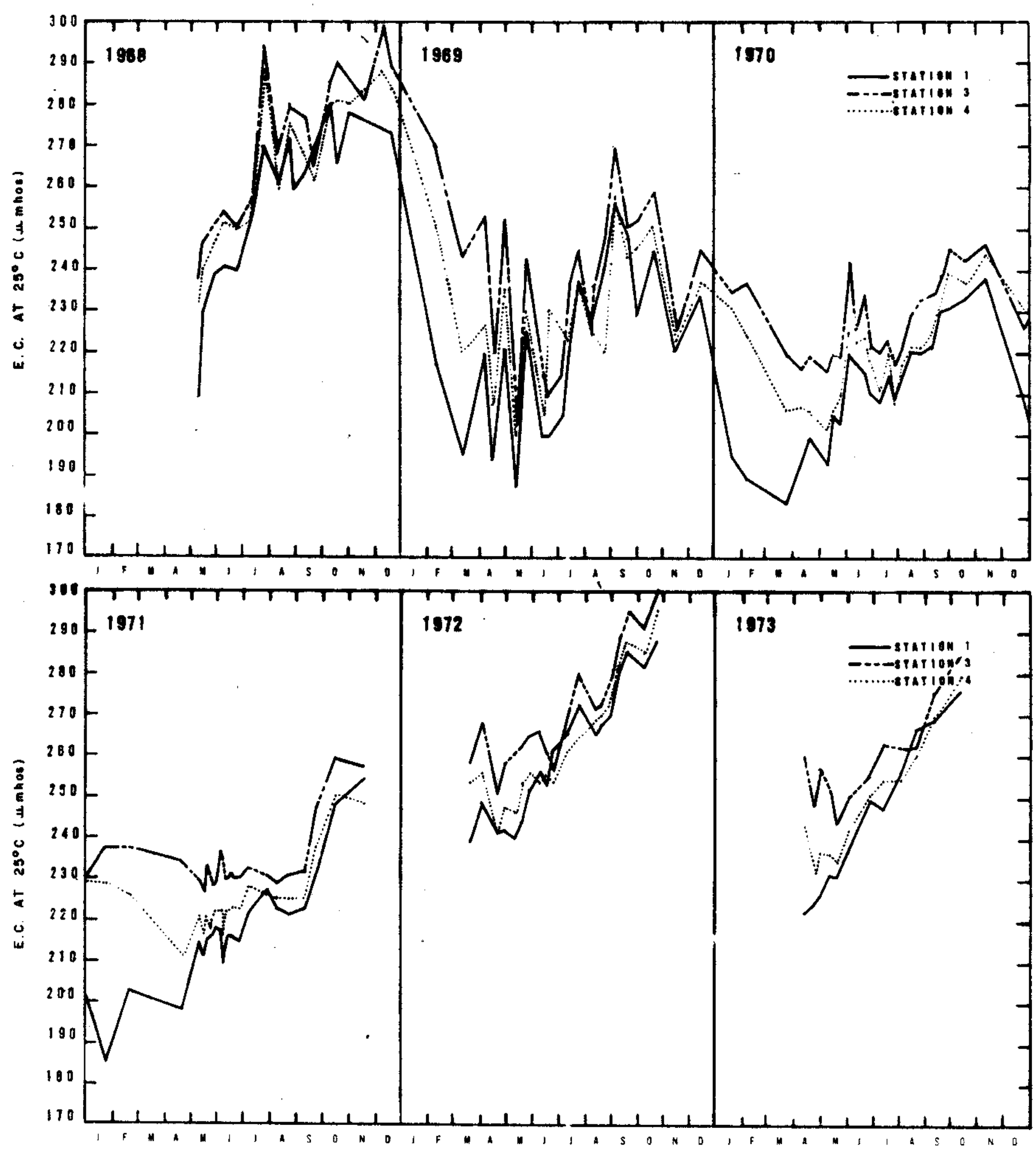


FIG 15 AVERAGE WATER COLUMN ELECTRICAL CONDUCTIVITY VALUES 1968-73

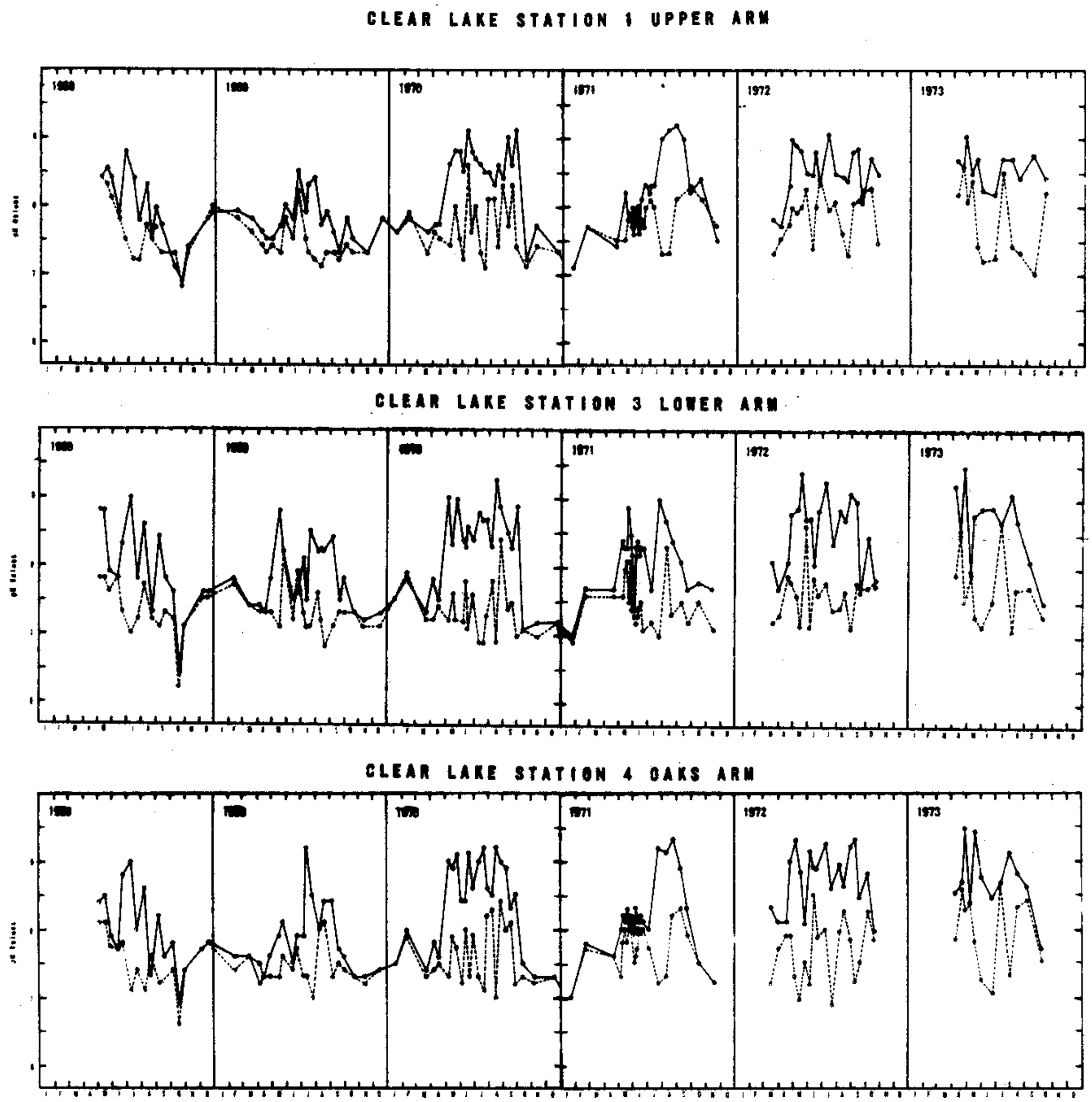


FIG 16 pH VALUES IN SURFACE AND BOTTOM METER OF WATER COLUMN— 1968 -73

The end equivalence point was determined with a portable glass electrode, solid-state pH meter. The values are shown in Figure 17.

Dissolved Oxygen

Dissolved oxygen concentrations throughout the water column were measured at each station during every survey. Measurements were obtained by an oxygen analyser which uses the electrometric method incorporating a membrane-covered electrode system. The instrument was calibrated and checked in-situ using the modified Winkler titration method. During surveys in which the dissolved oxygen analyser failed to function properly, dissolved oxygen values were determined within the water column using the modified Winkler method on samples collected at the surface, bottom, and 2-meter or 3-meter intervals depending on the depth of the water column.

The dissolved oxygen values measured in the water column during each survey are shown in Appendix B. The DO values measured in the surface and bottom samples are shown chronologically in Figure 18.

Boron

Detection of relatively high boron concentrations in the outflow water from Clear Lake by the Department of Water Resources surface water monitoring program was the reason this Department initiated the 1963 water quality investigation of Clear Lake.

Since 1951, samples have been collected and analyzed from the two monitoring stations in the Clear Lake drainage basin. Analyses has been by the Carmine method as described in Standard Methods. The results of the analyses are included in the data presented in Appendix D.

Samples collected throughout the lake on May 20, 1964, show an increase in the boron concentrations from the Upper Arm towards the outlet (Figure 19).

The only known direct sources of high concentrations of boron to the lake are the thermal springs issuing forth in Soda Bay.

Two of these springs exist close together on the east side of the bay; a third smaller one is located northwest of these near the east shore of the State Park (Figure 20). The springs are easily found because of the orange rust color that appears on the rocks that contact their waters. The total flow from the springs is estimated at less than 450 gallons per minute (DWR Bulletin 143-2).

Analyses of these springs show the water contains concentrations of calcium (93 ppm) and chloride (66 ppm), exceeding those found in Clear Lake. The analyses also revealed extremely high concentrations of total iron and boron -- 20 ppm and 15 ppm respectively. The complete analyses are shown in Appendix A.

To ascertain how the high boron concentration in these spring waters affect the lake, a series of samples was collected from the lake in the vicinity of these springs. The boron values of these samples and the sample collection pattern are shown in Figure 20.

Possible sources of boron adjacent to the lake exist in the areas of Sulfur Bank Mine, Big Borax Lake, and Little Borax Lake. None of these has a known direct connection to the lake although flood waters in Little Borax have been pumped to Clear Lake.

The Sulfur Bank Mine, adjacent to the lake at the east end of the Oaks Arm, is located in an area of volcanic vent activity. Fault fracture zones in the area provide channels for hot water and sulfur gases that still issue from vents in the area. These gaseous vapors are charged with carbon dioxide, hydrogen sulfide, methane, and nitrogen.

Mining has changed many of the topographic features of this area. Large excavations have been made and tailing dumps extend over the area. Highly saline waters originating in this area are prevented from entering the lake by containment within the excavations.

Water Supply Paper 1473 (U. S. Geological Survey) reported that a sample of water taken from Sulfur Bank Springs showed 528 ppm of boron. The date of the sample is not given and the spring no longer exists. Since 1952, the Department of Water Resources personnel have collected other samples, one of them steam condensation from a well in the Sulfur Bank Spring area. The analyses show the minerals in the samples contain large variations in particular constituents but all contain high concentrations of dissolved mineral. Table 14 shows a comparison of minerals in the samples.

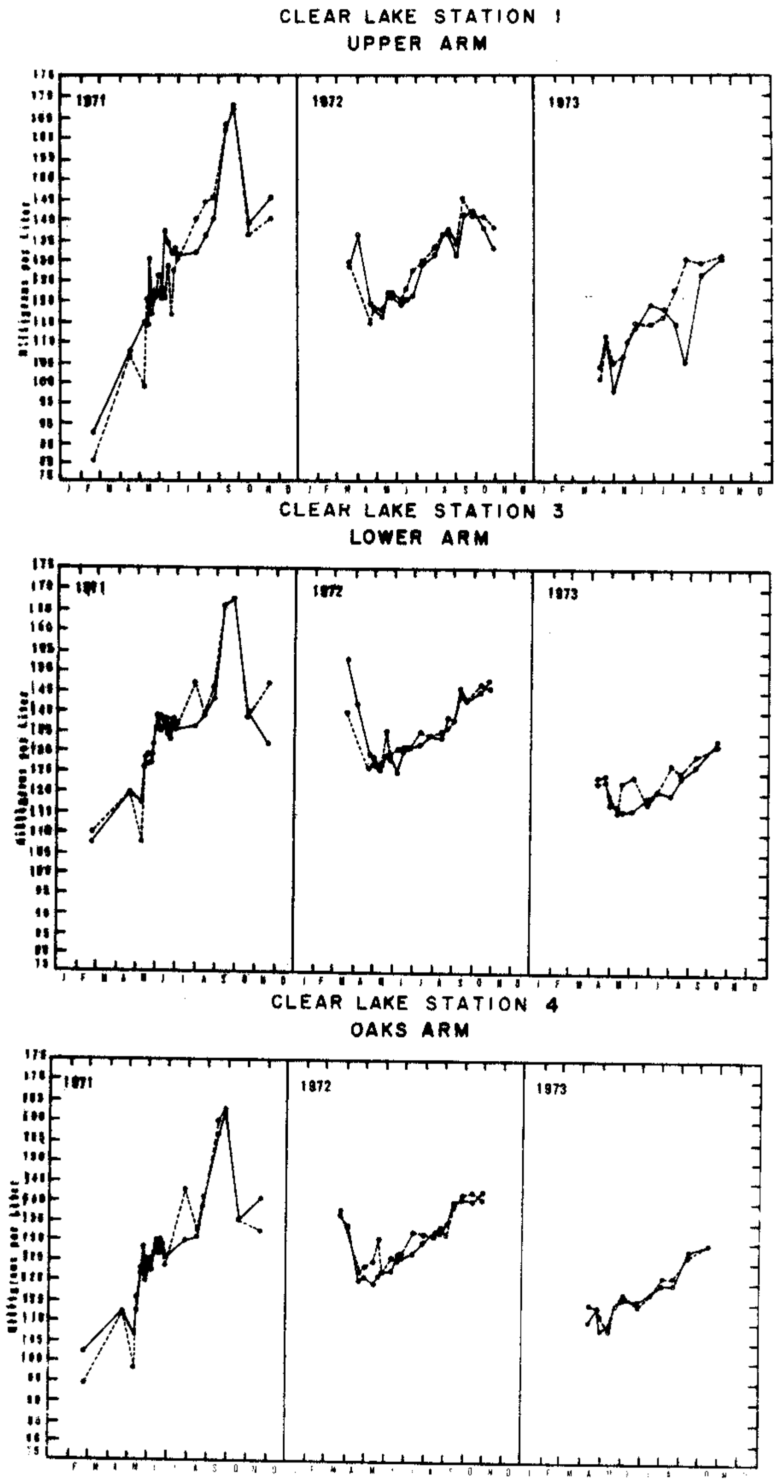


FIG 17 ALKALINITY VALUES IN SURFACE AND BOTTOM METER

OF WATER COLUMN 1971-73

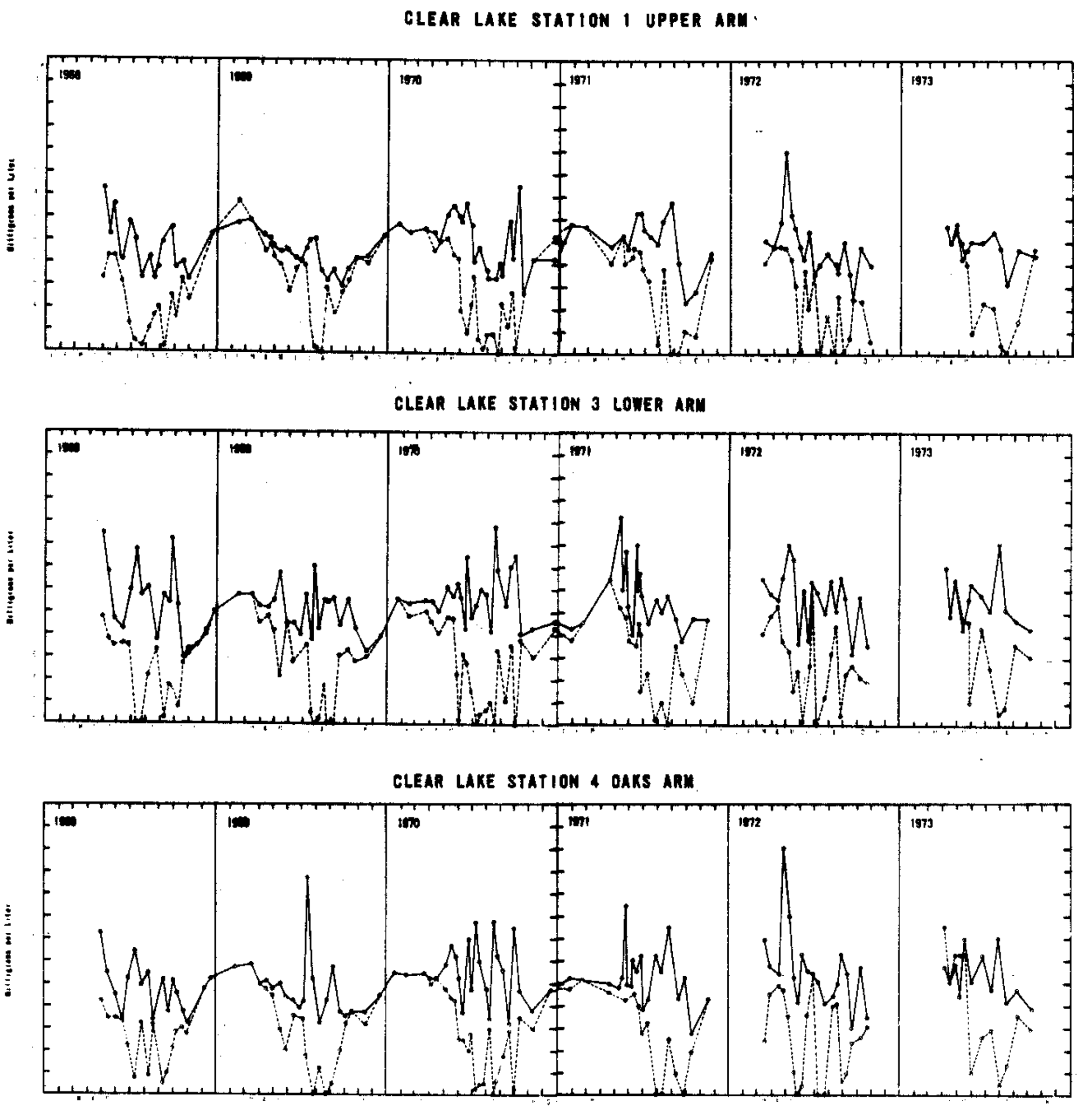
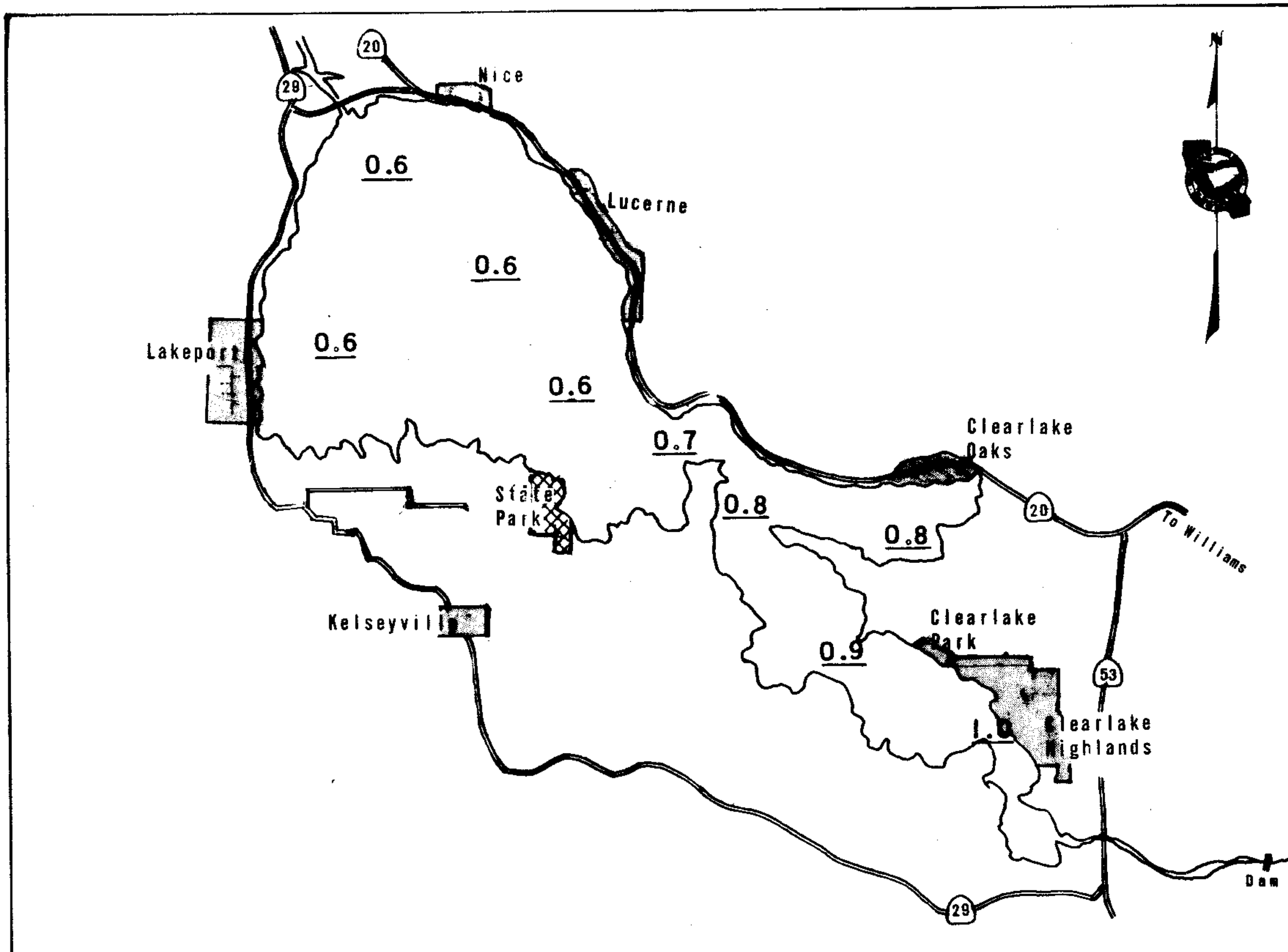
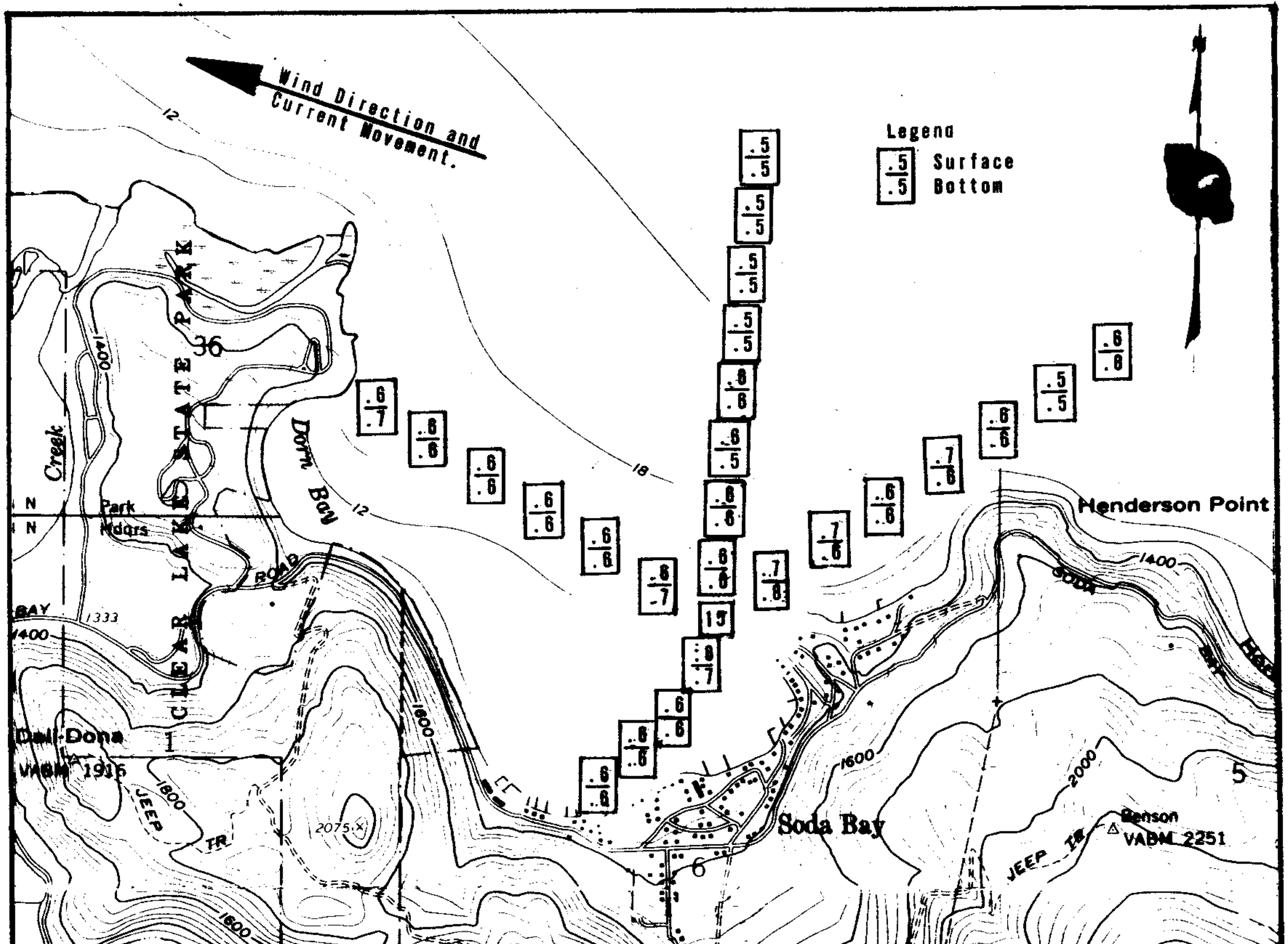


FIG 18 DISSOLVED OXYGEN CONCENTRATIONS IN SURFACE AND BOTTOM METER OF WATER COLUMN 1968-73



Boron concentrations at various lake stations as determined on May 20, 1964

Figure 19



Boron concentrations of water collected in Soda Bay near Soda Springs. May 20, 1964.

Figure 20

TABLE 14

COMPARISON OF HISTORICAL MINERAL ANALYSES
ON WATER FROM SULFUR BANK MINE AREA

Mineral	Sulfur Bank Spring	Condensate from Geothermal Well at Sulfur Bank Mine	Sulfur Bank Mine Sump Water	
Date	Prior to 1959	4/64	1/24/52	2/28/62
Silica	67	478		
Calcium	56	1		
Magnesium	57			
Sodium	1,390	720	136	
Potassium	68	65	20	
Bicarbonate	1,890	2,312		
Sulfate	1,980	36	5,400	
Chloride	489	954	303	
Boron	528	584	20	970
EC				6,020

The boron concentrations of Big and Little Borax Lakes are also known to be high. For a short time, Big Borax Lake was the major source of borax in the United States.

A sample of water was obtained from Big Borax Lake by the California Division of Mines in January 1947 when the lake was 3 to 4 foot deep. The results of the analyses are presented in the following tabulation:

Sodium Carbonate	18,535 mg/l
Sodium Borate	485 mg/l
Sodium Chloride	1,760 mg/l
Potassium Chloride	1,780 mg/l
Sodium Sulfate	10 mg/l
Magnesium Acid Carbonate	100 mg/l
Miscellaneous and Organic	540 mg/l
Total Salinity	23,210 mg/l

An analysis of a sample collected from Little Borax Lake on March 26, 1965, following a period of heavy inflow to the lake, showed the water to be highly saline sodium carbonate type with 94 ppm of boron. The results of this analysis is shown in the following page.

What was once though to be large springs discharging into the lake at several locations have been proved to be escaping gas. These gas seeps are located in two areas at the lower end of the Upper Arm, about one mile west of the northwest tip of Buckingham Point.

	mg/l		mg/l
Calcium	5.3	Carbonate	840
Magnesium	29	Bicarbonate	885
Sodium	850	Sulfate	3.6
Potassium	205	Chloride	224
		Nitrate	0.0

Total Phosphorus	0.10
Dissolved Iron	0.02
Boron	94
Total Dissolved Solids	3,060

The gas seeps are sometimes hard to find, especially when the surface of the lake is choppy, as they do not bubble constantly but tend to be cyclic, being only slightly active for a number of minutes and the showing increased activity for three or four minutes.

Although they have the appearance of springs, analyses of water taken in their vents are identical in chemical constituents and temperature to that of the lake water (Appendix A).

There is no known analysis of this escaping gas, though it is believed to be methane as a sample of the gas trapped in an inverted bottle was odorless and caused a mild explosion when ignited.

Heavy Metals and Trace Metals

In this report those constituents reported as heavy metals were analyzed by the colorimetric method and include aluminum, cadmium, hexavalent and total chromium, copper, iron, lead, manganese, nickel and zinc. Trace metals are those metals determined by the spectrophotometric method. These include in addition to the above, the following: beryllium, bismuth, cadmium, cobalt, gallium, germanium, molybdenum, titanium and vanadium.

The Department has made a number of heavy metal and trace constituent analyses on samples collected from Clear Lake. These data are presented in Appendix A.

Additional analyses have been made by Dr. Charles Goldman at the University of California at Davis, and by the Clear Lake Algae Research Unit at Lakeport. The major portion of their analyses were for the two heavy metals, iron and copper. These data are not available for inclusion in this report.

Nutrients

Nutrient analyses were made of the water in the lake, precipitation, inflowing and outflowing surface water and on the sediments of the lake. The nutrients determined were nitrate, ammonia, organic nitrogen, orthophosphate and total phosphorus.

The nutrient concentrations for all samples collected were determined following instructions for methods listed for each constituent in the 12th and 13th editions of Standard Methods for Examination of Water and Waste Water, APHA, AWWA, and WPCF. The results are reported as the different forms of the basic element.

The specific analytical methods used were:

Nitrate	- modified - modified Brucine (Jenkins 1964 Anal. Chem. 36:610)
Ammonia	- Nesslerization
Organic Nitrogen	- Kjeldahl Amino Napthal-sulfuric acid
Orthophosphate	- Stannous Chloride
Total Phosphate	- nitric - sulphuric acid digestion

Lake water samples analysed during 1968, the first year of data collection, were a composite of the water column from the surface to the Secchi disc depth.

From 1969 on, samples for analyses were collected from the surface and bottom of the water column at all three stations during each survey with occasional samples collected at 2-meter or 3-meter intervals. Immediately upon collection, the samples were placed on dry ice for freezing before being transported to the laboratory. The samples analyzed for orthophosphate were filtered through a presoaked 0.45 micron membrane filter prior to being frozen.

Graphs summarizing the average concentrations of the different forms of nitrogen detected in the water column at each station are presented in Figure 21. A summary of the different forms of phosphorus present in the water column are shown in Figure 22. Graphs showing the same forms of the two nutrients present in the bottom meter of water only are presented in Figures 23 and 24. Actual values of the different forms of nutrients present in the water column during each survey are presented in Appendix B.

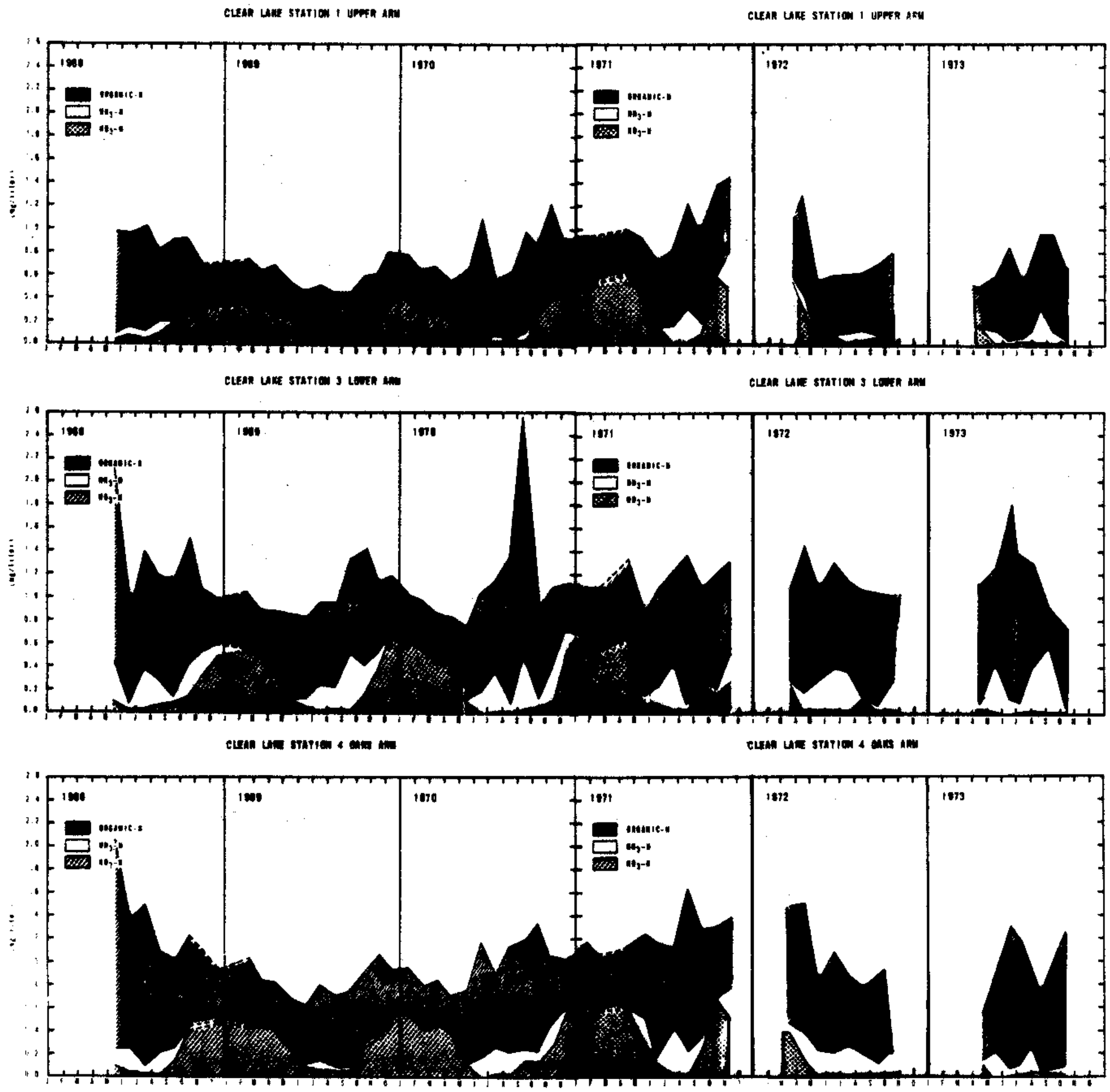


FIG 21 ACCUMULATIVE PLOT OF NITROGEN FORMS IN AVERAGE WATER COLUMN 1968-73

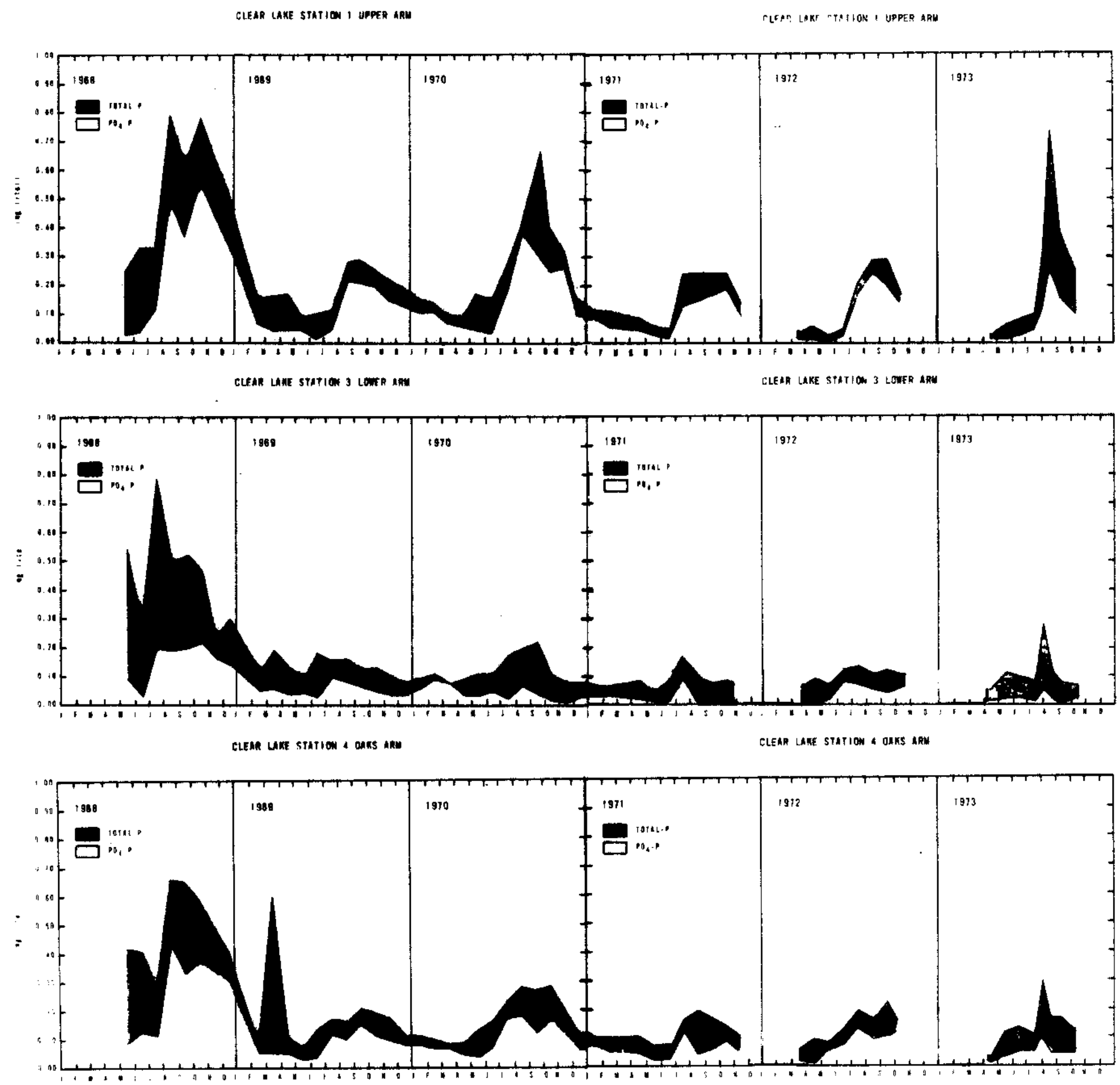


FIG 22 ACCUMULATIVE PLOT OF PHOSPHORUS FORMS IN AVERAGE WATER COLUMN

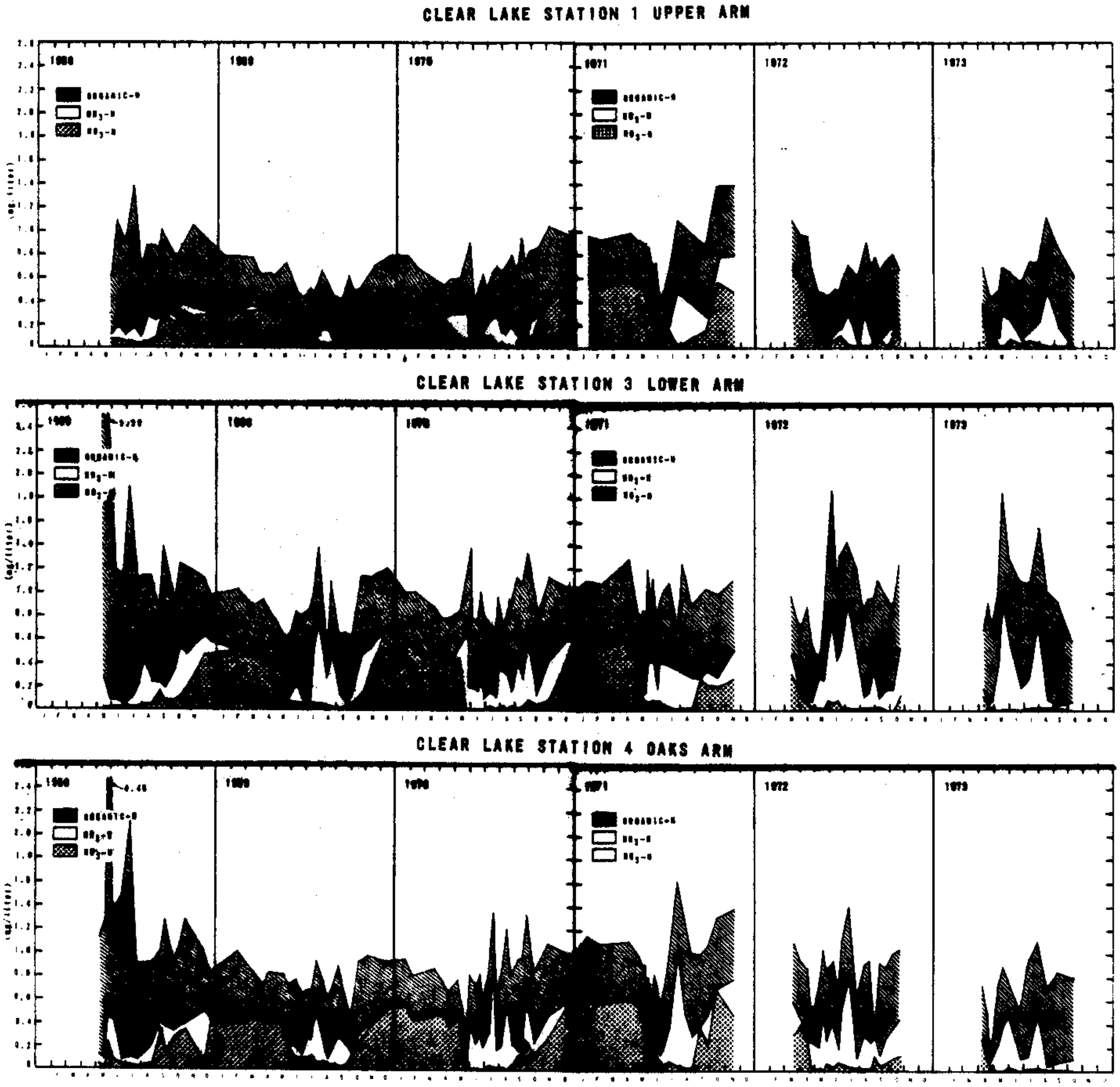


FIG 23 ACCUMULATIVE PLOT OF NITROGEN FORMS IN BOTTOM METER OF WATER 1968-73

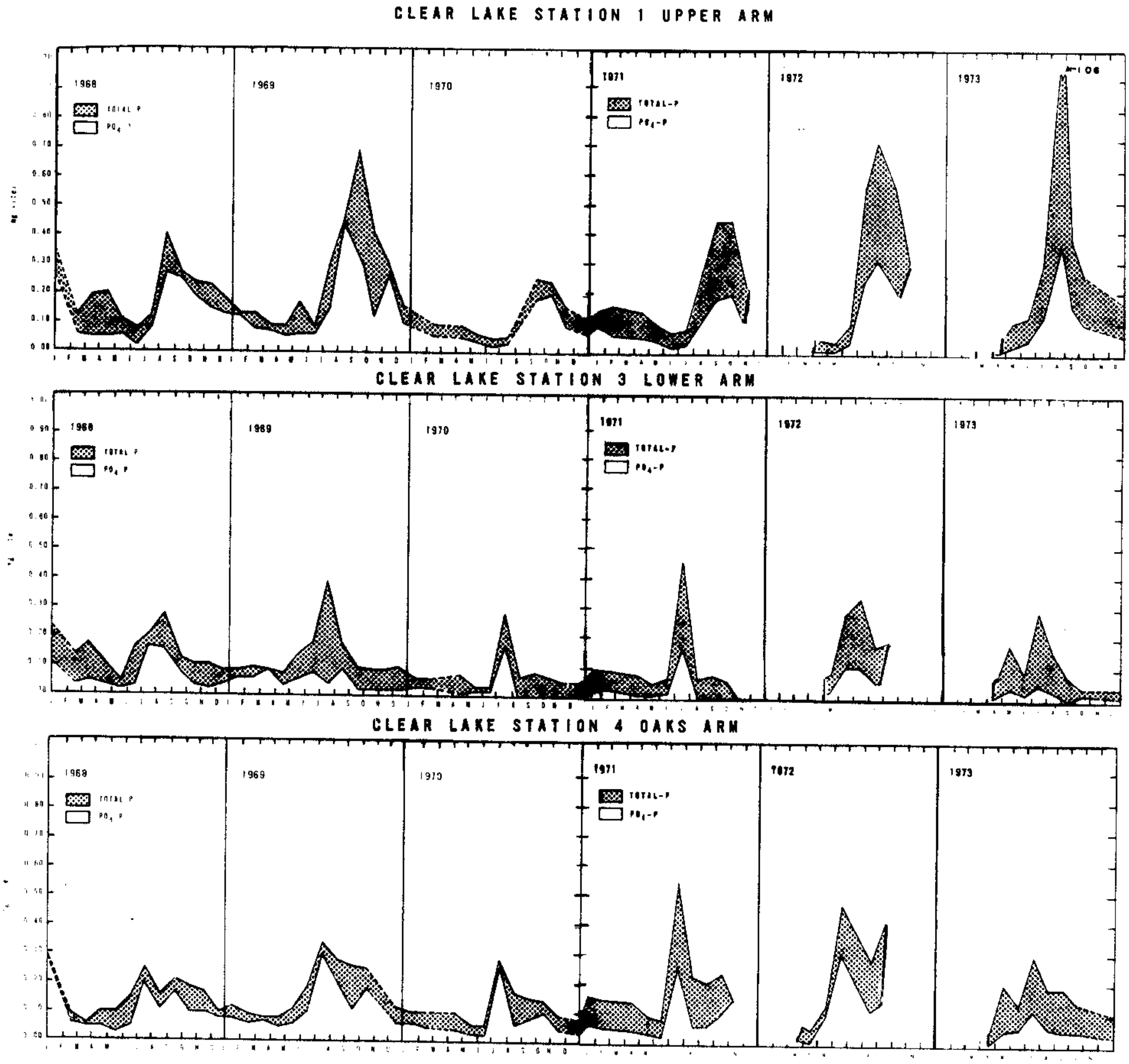


FIG 24 ACCUMULATIVE PLOT OF PHOSPHORUS FORMS IN BOTTOM METER OF WATER 1968-73

Precipitation samples were collected in two areas around Clear Lake in 1969. These samples were analyzed for the amounts of the different forms of nitrogen that each contained. The samples were collected using an aluminum funnel one square meter in area. Prior to start of collection, each funnel was rinsed with a double-distilled water and hydrochloric acid solution. The results of these analyses are presented in Table 15.

TABLE 15

NITROGEN CONCENTRATIONS IN PRECIPITATION AT CLEAR LAKE, CALIFORNIA 1969

Date	Continuous Hours of Collection	Est. Precip. in Inches	NO_3-N mg/l	NH_3-N mg/l	ORG N mg/l
Monitor Point					
12-11	6	.3	0.87	0.22	2.0
12-12	18	.7	0.12	0.01	0.2
12-12	6	.2	0.13	0.08	0.1
12-13	14	.4	0.09	0.04	0.1
12-18	4	.4	0.47	0.16	0.2
12-19	24	1.2	0.07	0.02	0.0
12-20	21	0.7	0.04	0.00	0.0
Reeves Point					
12-18	4	.2	0.74	0.60	0.6
12-19	27	.8	0.04	0.10	0.1
12-20	19	1.5	0.08	0.06	0.2
Lucerne Park					
12-18	4	.2	0.95	0.56	0.8
12-19	29	.8	0.16	0.18	0.4
12-20	20	1.5	0.06	0.04	0.1

Inflowing and outflowing waters from Clear Lake were sampled and analyzed for their nutrient concentrations. Most of the samples were collected during stormy periods which coincided with periods of high runoff in the streams. The streams, the date sampled, the estimated instantaneous flow at the time of sampling, and the results of the analyses are presented in Table 16.

TABLE 16

NUTRIENT CONCENTRATIONS IN INFLOWING WATER TO CLEAR LAKE
mg/l

Stream	Location Sample PT.	Date	Est. Flow	NO_3 N	NH_3 N	ORG. N	PO_4 P	TOTAL P
Middle	15N-9W-12J	12-10-68	300	0.39	0.02	1.5	0.03	0.14
		12-14-68	10	0.24	0.04	0.3	0.02	0.03
		1-13-69	2000	0.27	0.00	1.4	0.02	1.46
		2-15-69	750	0.19	0.00	0.5	0.01	0.46
		12-19-69	600	0.09	0.00	0.9	0.03	0.11
		1- 9-70	500	0.12	0.03	1.5	0.02	0.10
		1-14-70	2500	0.06	0.10	2.0	0.00	0.24
		1-16-70	500	0.39	0.00	1.1	0.01	0.81
		1-17-70	2000	0.16	0.00	0.6	0.02	0.42
		1-21-70	1100	0.08	0.02	0.6	0.02	0.27
		1-23-70	4500	0.04	0.02	4.8	0.01	2.30
		1-24-70	2000	0.12	0.00	1.1	0.02	0.50
		1-27-70	1000	0.17	0.00	0.5	0.13	0.42
		4-16-70	20	0.23	0.00	1.3	0.03	1.00
		12- 1-70	500	0.23	0.00	0.2	--	0.03
		12-17-70	300	0.25	0.00	0.0	0.03	0.03
		1-16-71	5000	0.15	0.14	1.4	0.00	0.42
		1-26-71	200	0.32	0.00	0.0	0.01	0.02
Morrison	14N-8W- 6D	12-10-68	5	0.21	0.00	1.5	0.04	0.65
Schindler	14N-7W-29N	12-10-68	2	0.05	0.01	0.2	0.05	0.13
		2-15-69		0.14	0.00	0.8	0.07	0.07
Seigler	12N-7W- 2D	10-14-68	2	0.10	--	-	--	0.07
		12-10-68	120	0.55	0.06	1.8	0.17	0.60
		12- 1-70	2	0.26	0.00	0.3	--	0.04
		12-18-70	75	0.16	0.00	0.1	0.02	0.05
Kelsey	13N-9W- 2D	12-10-68	2000	0.26	0.00	3.7	0.05	1.10
		12-11-68	240	0.40	0.01	0.3	0.02	0.07
		12-14-68	300	0.30	0.04	0.4	0.03	0.09
		1-13-69	2000	0.06	0.00	1.5	0.03	1.50
		1-21-69	2000	0.07	0.08	0.9	0.02	1.50
		12-12-69	750	0.19	0.01	2.1	0.04	0.34
		12-19-69	1300	0.10	0.01	1.2	0.04	0.34
		12-23-69	750	0.19	0.00	0.4	0.03	0.44
		1- 8-70	30	0.16	0.00	0.1	0.03	0.66
		1-14-70	2500	0.04	0.01	1.0	0.03	0.79
		1-16-70	2500	0.10	0.01	1.7	0.02	1.30
		1-17-70	850	0.14	0.00	0.2	0.04	0.22
		1-21-70	1500	0.07	0.00	0.7	0.11	--
		1-23-70	650	0.07	0.02	0.3	0.02	0.12
		1-24-70	2000	0.04	0.00	1.5	0.03	0.62

TABLE 16
(Continued)

Stream	Location Sample PT.	Date	Est. Flow	NO_3 N	NH_3 N	ORG. N	PO_4 P	TOTAL P
Kelsey	13N- 9W- 2D	1-27-70	750	0.13	0.01	0.3	0.02	0.36
		12- 1-70	500	0.29	0.00	0.2	--	0.01
		12-17-70	300	0.17	0.00	0.1	0.02	0.04
		1-16-71	1000	0.12	0.00	0.3	0.01	0.12
		1-26-71	40	0.50	0.00	0.0	0.02	0.04
Forbes	14N-10W-24R	12-11-68	15	1.20	0.92	0.7	1.14	2.20
Manning	13N- 9W- 6B	12-10-68	100	2.40	0.02	2.0	0.06	0.06
		1-13-69		0.40	0.00	0.7	0.07	0.40
		12- 1-70		2.80	0.00	0.5	--	0.01
		12-17-70		0.87	0.00	0.2	0.03	0.06
Scott	15N-10W- 9H	10-14-68	4	0.16	--	-	--	--
		12-10-68	1500	0.29	0.02	3.5	0.04	0.05
		12-11-68	400	0.48	0.14	0.4	0.03	0.29
		12-14-68	500	0.34	0.01	0.5	0.02	0.05
		1-13-69	2000	0.15	0.00	0.7	0.03	0.90
		2-15-69	1000	0.16	0.02	0.3	0.01	0.06
		12-23-69	200	0.25	0.01	0.4	0.02	0.15
		1- 9-70	750	0.16	0.02	0.6	0.05	0.29
		1-14-70	3200	0.07	0.05	1.7	0.03	0.55
		1-16-70	2500	0.15	0.00	0.6	0.08	0.82
		1-17-70	1800	0.12	0.00	0.3	0.02	0.35
		1-21-70	3000	0.08	0.02	0.5	0.02	0.12
		1-23-70	4500	0.09	0.00	0.9	0.03	0.26
		1-27-70	1000	0.21	0.00	0.3	0.04	0.40
		12- 1-70	1000	0.48	0.00	0.3	--	0.06
		12-17-70	300	0.42	0.00	0.2	0.03	0.07
		1-16-71	4000	0.17	0.00	0.4	0.02	0.28
		1-26-71	120	0.42	0.00	0.1	0.00	0.03
Adobe	14N- 9W-33L	12-10-68	450	0.13	0.14	1.4	0.04	0.85
		12-11-68	55	0.36	0.00	0.5	0.03	0.10
		12-14-68	200	0.26	0.00	0.4	0.03	0.08
		1-13-69	250	0.20	0.00	0.6	0.04	0.80
		1-21-69	500	0.06	0.00	0.6	0.03	0.80
		2-15-69	100	0.18	0.00	0.3	0.02	0.22
		12- 1-70	100	0.34	0.00	0.3	--	0.02
		12-17-70	60	0.29	0.00	0.1	0.02	0.10
Cole	13N- 9W- 2A	12-10-68	50	0.44	0.07	1.3	0.18	0.55
		1-21-69		0.22	0.02	0.8	0.14	0.65

Samples of outflowing waters were collected on a more routine basis throughout the year. The results of their analyses, date samples, and instantaneous flow are presented in Table 17.

TABLE 17

NUTRIENT CONCENTRATIONS IN OUTFLOWING WATER
FROM CLEAR LAKE AT STATION BELOW CLEAR LAKE DAM

Date	Measured Outflow	NO_3 N	NH_3 N	Org. N	PO_4 P	Total P
8-21-68	8	0.04	0.06	1.2	0.03	0.14
9- 4-68	2	0.03	0.05	1.0	0.04	0.13
9-18-68	2	0.04	0.88	1.7	0.05	0.19
10- 3-68	100	0.07	0.68	0.9	0.03	0.10
10-17-68	40	0.11	1.10	0.9	0.10	0.26
10-30-68	2	0.36	0.29	1.4	0.01	0.09
12- 4-68	2	0.86	0.42	0.6	0.02	0.03
1-22-69	3,300	0.32	0.12	0.8	0.03	0.26
2-15-69	4,000	0.33	0.00	0.5	0.01	0.25
1-16-70	3,000	0.62	0.02	0.6	0.06	0.16
1-18-70	3,000	0.64	0.01	0.6	0.04	0.14
1-21-70	3,300	0.33	0.04	0.5	0.03	0.22
1-26-70	4,500	0.26	0.00	0.5	0.03	0.16
2- 9-70	3,400	0.46	0.03	0.5	0.07	0.09
4-16-70	120	0.20	0.00	0.6	0.03	0.07
9-17-70	250	0.20	--	-	0.00	--
10-22-70	15	0.20	--	-	0.00	--
11-12-70	5	0.12	--	0.8	0.00	0.07
12-10-70	5	0.26	--	0.6	0.00	0.10
12-17-70	5	0.28	0.00	0.2	0.02	0.04
1- 7-71	500	0.62	--	0.5	0.04	0.06
1-26-71	2,400	0.66	0.01	0.5	0.03	0.06
2- 4-71	15	0.86	--	0.6	0.01	0.03
3- 4-71	15	0.13	--	0.6	0.00	0.04
4- 8-71	10	0.49	--	0.7	0.01	0.04
5- 5-71	220	0.41	--	0.7	0.05	0.07
6-24-71	700	0.07	--	1.6	0.02	0.10
8-19-71	300	0.04	--	1.1	0.00	0.12

Sediment nutrient concentrations were determined on at least two occasions. The first was in October 1965 when, samples of the sediments for approximately two centimeters in depth were collected and analyzed. The concentrations of the constituents analyzed are shown in Table 18. Station locations are shown in Figure 25.

The second known analyses of nutrients in the sediments was made on samples collected in 1968 by the U. S. Geological Survey.

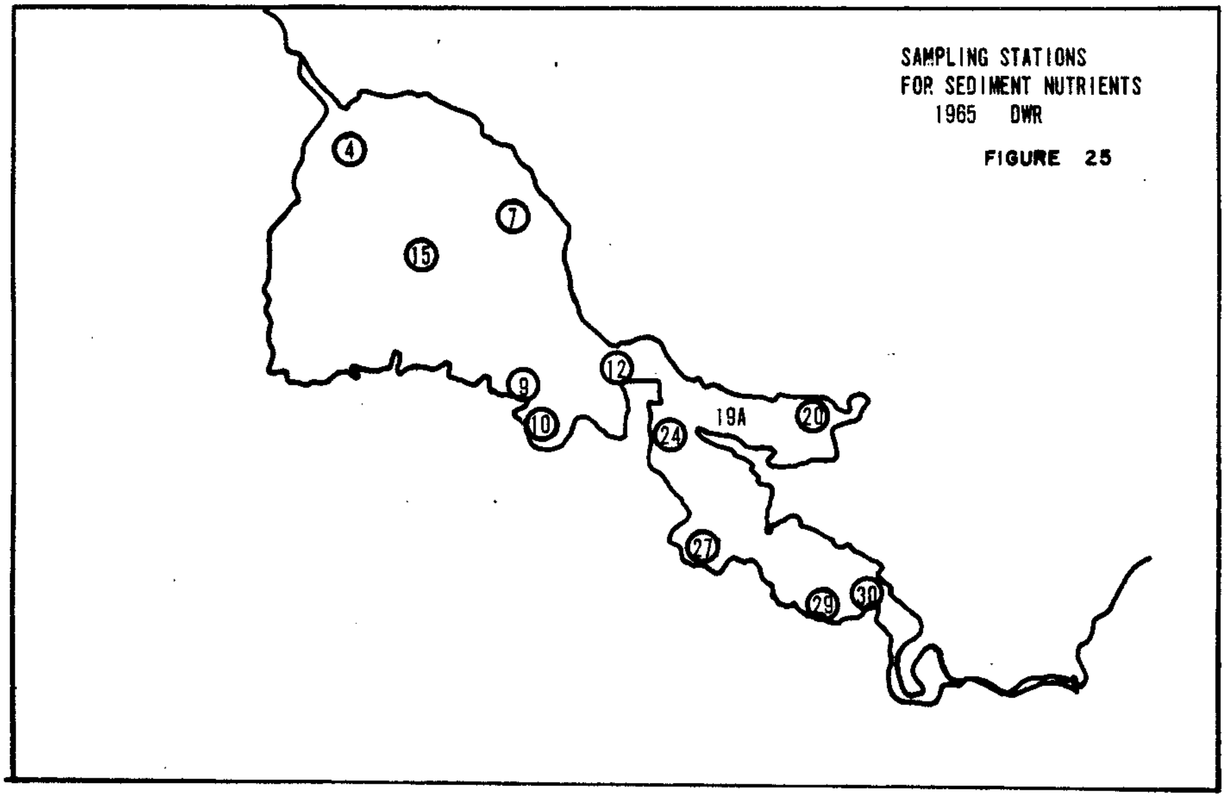
Location of sediment sampling stations is shown in Figure 26. The results of these analyses are presented in Table 19, though the depth interval from which the sediments were taken are not known.

The U. S. Geological Survey also determined the phosphorous concentrations throughout a 6-foot sediment core removed from the lake at Station 9C in the Upper Arm. These data are presented in Table 20.

TABLE 18

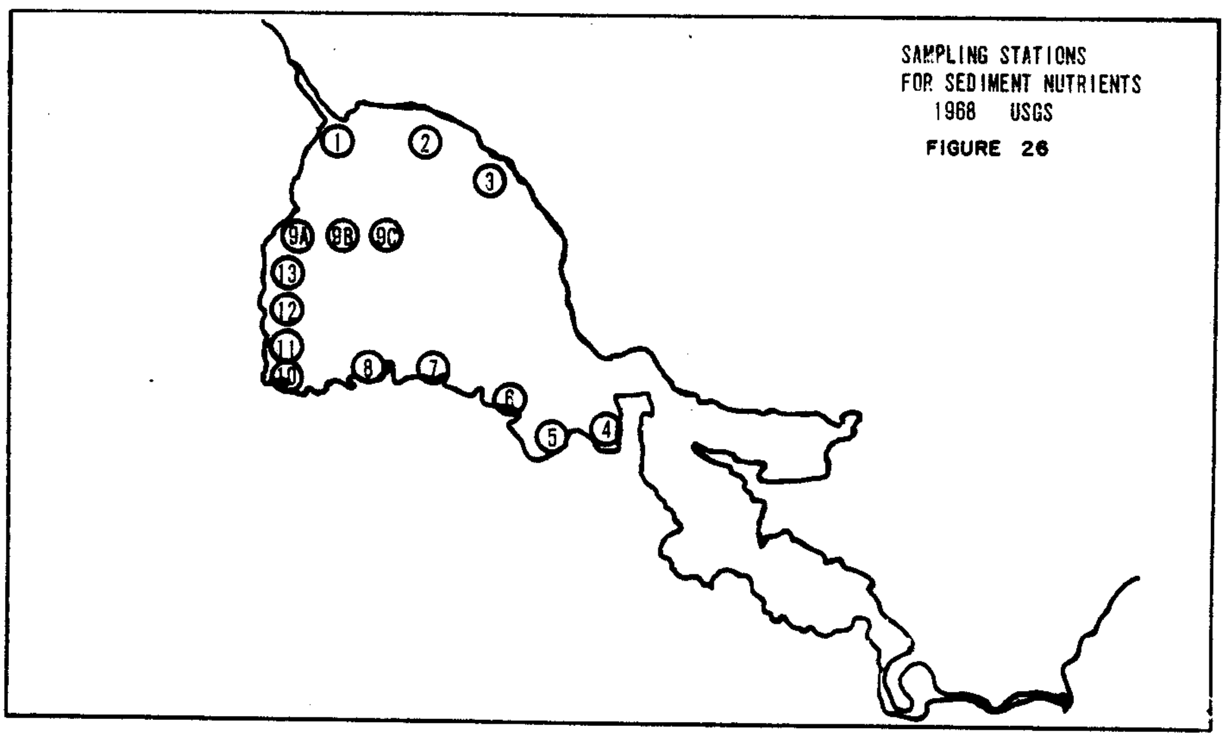
NUTRIENT ANALYSES OF SEDIMENTS IN CLEAR LAKE
OCTOBER 1964
mg/l

Station	Ammonia-N (dry soil) NH_3-N	Nitrate-N (dry soil) NO_3-N	Organic Nitrogen (dry soil) N	Total Plus Organic Phosphate (dry soil) PO_4	Total Plus Organic Phosphate (extract) PO_4
4	18	9.8	4,600	5.9	0.2
7	40	13.0	3,600	58.0	0.2
9	25	5.1	1,600	1.8	0.4
10	104	20.0	6,300	4790.0	2.0
12	60	20.0	8,600	496.0	0.0
15	21	18.0	8,900	49.0	0.2
19a	165	15.0	9,800	3190.0	3.2
20	193	17.0	12,000	934.0	3.8
24	119	18.0	12,000	80.0	0.4
27	111	13.0	1,600	0.0	1.2
29	150	17.0	12,000	12.0	1.8
30	193	5.6	2,300	6.8	3.3



SAMPLING STATIONS
FOR SEDIMENT NUTRIENTS
1965 DWR

FIGURE 25



SAMPLING STATIONS
FOR SEDIMENT NUTRIENTS
1968 USGS

FIGURE 26

Pesticides

Samples for pesticide analyses were <u>not</u> routinely collected by the Department.

However, a large amount of pesticide information related to Clear Lake was collected by Dr. Rudd of the University of California at Davis. These data were not available at the time of the preparation of this report.

During 1969, the Lake County Mosquito Abatement District collected samples for pesticides analyses from inflowing water and from lake sediments at the request of the State Water Quality Control Board. The

TABLE 19

NUTRIENT ANALYSES OF LAKE SEDIMENTS

Site Number	Organic Content (percent)	Concentration, in Milligrams per Kilogram: Organic Nitrogen	Ammonia Nitrogen	Nitrate Nitrogen	Total Phosphorus
		May 22, 1968			
LW- 1	2.3	819	33.1	14	4.5
LW- 2	4.6	1,340	18.6	.00	11.9
LW- 9A	6.0	2,310		.80	7.7
LW- 9B	4.8	2,940		.00	16.1
LW- 9C	5.8	2,960	28.8	.00	9.8
LW-11	4.4	1,760	45.9	.00	3.0
LW-12	4.5	1,900	21.0	.00	9.8
LW-13	4.7	3,000	37.4	.30	11.2
		July 2, 1968			
LW- 1	2.0	812	198	1.10	15.8
LW- 2	4.9	1,990	150	1.10	38.1
LW- 3	2.3	366	36	.00	2.1
LW- 4	6.2	2,550	294	.00	53.8
LW- 5	6.5	2,880	264	.00	2.5
LW- 6	3.7	1,090	177	1.10	12.1
LW- 7	2.3	420	52	.00	5.5
LW- 8	4.1	1,130	106	.00	20.5
LW- 9A	8.8	2,280	144	.00	29.3
LW- 9B	4.4	2,200	173	.00	43.4
LW- 9C	4.6	2,300	197	.00	41.1
LW-10	3.9	1,530	146	.00	13.9
LW-11	2.9	884	76	.00	14.6
LW-12	4.4	1,610	142	.00	18.8
LW-13	1.7	463	63	.00	7.4

TABLE 19
(Continued)

Site Number	Organic Content (percent)	Concentration, in Milligrams per Kilogram Organic Nitrogen	Ammonia Nitrogen	Nitrate Nitrogen	Total Phosphorus
		August 12, 1968			
LW- 1	3.5	711	67	3.5	178
LW- 2	5.3	2,000	155	2.5	285
LW- 3	3.2	660	44	3.5	284
LW- 5	4.4	2,440	235	2.0	292
LW- 6	3.4	977	136	2.5	96
LW- 7	3.7	1,120	85	3.5	132
LW- 8	3.8	989	70	2.5	66
LW- 9A	1.5	650	64	2.5	323
LW- 9B	3.6	2,360	179	2.5	296
LW- 9C	3.2	1,580	145	3.5	476
LW-11	1.4	220	22	1.0	1,020
LW-12	3.4	1,880	107	3.5	1,490
LW-13	2.7	1,620	110	2.5	75

Note: Organic content based on dry weight and ignition at 450° C. for 24 hours. Organic nitrogen and total phosphorus based on wet weight of sediment sample. Samples were drained on tissue paper for 2 hours.

TABLE 20

PHOSPHORUS CONCENTRATIONS IN SEDIMENT CORE
OBTAINED AT STATION 9C, MAY 13, 1969

Core Length (feet)	Concentration, in Milligrams per Kilogram Orthophosphate	Total Phosphorus
0	30	60
1	30	50
2	20	40
3	20	40
4	20	50
5	20	60
6	20	40

samples were submitted to the Federal Water Pollution Control Administration laboratory in Alameda, California, and analyzed for their chlorinated pesticide content. Table 21 contains the results of the analyses of inflowing surface water and Table 22 presents the analyses of the chlorinated pesticides in the sediments of Clear Lake.

TABLE 21

CHLORINATED PESTICIDE ANALYSES
OF SURFACE WATER INFLOW TO CLEAR LAKE
1969

Date	Location	Pesticide	Concentration ppb.
2- 4-69	Runoff to Kelsey Creek from south end of Quercus Ranch pear orchards north of Soda Bay Road	Kelthane	11.5
		Thiodan	2.64
		DDE	15.1
		ppDDD-opDDT	8.3
		ppDDT	33.9
	Runoff to Kelsey Creek from north end of Quercus Ranch pear orchards	BHC	.003
		Lindane	.001
		Heptachlor	.006
		Kelthane	.445
		Dieldrin-DDE	.045
		ppDDD-opDDT	.014
		ppDDT	.030
	Runoff to Kelsey Creek from State Park	BHC	.004
		Lindane	.002
		Heptachlor	.002
		Kelthane	.004
	Kelsey Creek at Soda Bay Road	None	
	Adobe Creek at Soda Bay Road	None	
	Rodman Slough at Bridge	None	
	Highland Springs Creek above reservoir - west branch	BHC	.003
		Lindane	.002
2-28-69	Runoff to Kelsey Creek from south end of Quercus Ranch pear orchard	BHC	.008
		Lindane	.005
		Kelthane	.530
		DDE	1.05
		ppDDD-opDDT	41.9
		ppDDT	197.5
	Cole Creek at Soda Bay Road	BHC	.009
		Lindane	.018
		Kelthane	.037
		DDE	.049
		ppDDD-opDDT	.043
		ppDDT	.052
		Endrin like	.008

TABLE 21
(Continued)

Date	Location	Pesticide	Concentration ppb.
2-28-69	Kelsey Creek at Soda Bay Road	BHC	.003
		Lindane	.003
	Adobe Creek at Soda Bay Road	BHC	.001
		Lindane	.002
		Heptachlor	.002
	Highland Springs Creek above reservoir - west branch	BHC	.001
		Lindane	.003
	Forbes Creek at Willow Point in Lakeport	BHC	.002
		Lindane	.003
		Dieldrin	.008
		Kelthane	.018
	Scotts Creek at Highway 29	None	
	Runoff to Scotts Creek from Richebaughs pear orchard	BHC	.006
		Lindane	.005
		Kelthane	.100
		Heptachlor	.006
		Dieldrin like	.090
		DDE	.022
		Eldrin like	.013
		DDD-DDT	.101
	Middle Creek at Upper Lake Bridge	Lindane	.004
	Rodman Slough from bridge	Lindane	.003
	Oaks Creek at Clear Lake Oaks	Lindane	.002
	Seigler Creek at Lower Lake Bridge	BHC	.004
		Lindane	.004
	Cache Creek at Highway 53 Bridge	BHC	.005
		Lindane	.004
		Heptachlor	.004
		Eldrin	.004

TABLE 22

CHLORINATED PESTICIDE ANALYSES
SEDIMENTS IN CLEAR LAKE
1969

Location	Date	Depth	Pesticide	Concentration ppb.
1/4 mile north of Lakeside Park near Long Tule Point	3-25-69	0"-1/2" (76.4% moist.)	opDDE	16.6
			ppDDE	22.0
			opDDD	26.0
			opDDD	55.0
		1"-2" (75.8% moist.)	opDDE	30.0
			ppDDE	42.0
			opDDD	42.0
			opDDD	95.0
		3"-4" (74.1% moist.	opDDE	18.7
			ppDDE	25.6
			opDDD	25.6
			ppDDD	49.9
		Homog. 0"-4"	opDDE	16.2
			ppDDE	23.6
			opDDD	26.5
			opDDD	49.2
			Kelthane	6.0
2 miles north of Lakeside Park near Long Tule Point (DWR Sta. #1)	3-25-69	0"-1/2" (87.6% moist.)	opDDE	11.5
			ppDDE	14.0
			opDDD	15.0
			opDDD	30.1
			Kelthane	5.5
		1"-2" (82.2% moist.)	opDDE	24.8
			ppDDE	26.0
			opDDD	26.2
			ppDDD	52.3
			Kelthane	7.5
		3"-4" (78.7% moist.)	opDDE	37.0
			ppDDE	32.6
			opDDD	47.9
			ppDDD	65.0
			Lindane	0.7
			Kelthane	7.0
		Homog. 0"-4"	opDDE	33.0
			ppDDE	43.2
			opDDD	49.5
			ppDDD	89.5
			Kelthane	6.0

TABLE 22
(Continued)

Location	Date	Depth	Pesticide	Concentration ppb.
1/2 mile north of Long Tule Point	4-14-69	0'-1' (85.1% moist.)	opDDE	3.0
			ppDDE	3.7
			opDDD	8.3
			ppDDD	16.3
		1'-2' (82.4% moist.)	opDDE	1.8
			ppDDE	2.3
			opDDD	4.5
			ppDDD	9.3
			Heptachlor	0.3
		2'-3' (80.3% moist.)	opDDE	0.3
			ppDDE	0.2
			opDDD	0.2
			ppDDD	0.4
			Heptachlor	0.1
		3'-4' (78% moist.)	None	
		4'-5' (76% moist.)	None	
		5'-6' (75.8% moist.)	None	

In 1970 the Department of Water Resources, in cooperation with the Lake County Mosquito Abatement District, collected samples from Clear Lake immediately prior to and following the Mosquito Abatement District's application of methyl parathion to the lake for control of the Clear Lake gnat.

The Lake County Mosquito Abatement District gages each application to result in an average concentration of 3.3 parts per billion in the water column.

Each sample, a composite of the surface, middle, and bottom of the water column, was analyzed in the Department of Water Resources laboratory at Bryte.

The analyses of these samples collected from five stations around the lake are presented in Table 23 and are for methyl parathion concentrations only.

TABLE 23

CLEAR LAKE METHYL PARATHION CONCENTRATIONS
ppb

Date	Near Lakeport	Near Lucerne	Near Soda Bay	Near Clear Lake Oaks	Near Clear Lake Highlands
7-16-70	0.013	0.009	0.008	0.009	0.008
	Applied 7-20-70 at 3.3			Applied 7-21-70 at 3.3	
7-23-70	1.13	0.70	1.08	0.76	0.75
8- 6-70	0.453	0.435	0.292	0.044	0.030
	Applied 8-10-70 at 3.3			Applied 8-11-70 at 3.3	
8-13-70	0.360	0.420	0.550	0.520	0.145
8-27-70	0.038	0.022	0.014	0.005	0.000
	Applied 8-31-70 at 3.3			Applied 9-1-70 at 3.3	
9- 3-70	1.40	1.40	1.70	0.90	0.70

Biological Parameters

Phytoplankton and zooplankton were the only two biological parameters on which data were collected by the Department.

Phytoplankton

In 1968 the phytoplankton samples were collected to the depth of the Secchi disc reading by using a long sampling tube. From 1969 on, phytoplankton samples were collected throughout the water column at one station in each of the lake's three arms, using a sampling tube approximately 1 meter long. Thus, the actual sampling depth, as compared to the reported depth, was as shown in the tabulation on the following page.

Samples were transferred to a sample bottle containing Lugols solution, placed in covered containers and transported to the Northern District laboratory. Samples were stored in the dark at room temperature.

Reported Depth of Plankton Sample in Meters	Actual Depth Interval of Plankton Sample in Meters
Surface	0 - 1
3	2.5 - 3.5
6	5.5 - 6.5
9	8.5 - 9.6
12	11.5 - 12.5
15	14.5 - 15.5
18	17.5 - 18.5

Identification to genera of algae, cell counts, and measurement of volume were made using a Sedgwick-Rafter counting cell and compound microscope. Replicate samples were submitted to the Bryte Laboratory periodically.

Northern District laboratory procedures for algae identification, cell and heterocysts counts, and volume measurements were to store all field samples for five to seven days to permit clumps of algae to become dispersed. The sample was thoroughly mixed and an aliquot then transferred to a 1-milliliter Sedgwick-Rafter counting cell. Identification, counting and volume measurement began after a settling period of 5-10 minutes for each filled cell. The cell was viewed through a compound microscope with combined objectives and lens totaling 210 power. Identification and cell count were made on two complete horizontal passes or scans selected randomly (generally 1/3 segments of the cell). Every organism showing pigmentation was counted if more than one-half of the organism was in the viewing field.

Cell length and diameter measurements were made with a micrometer eyepiece. Volumes were determined by assuming the algae cells or filaments to have regular geometric shapes.

Those assumed to be cylinders were such genera as *Anabaena*, *Aphanizomenon*, *Lyngbya*, *Ocillatoria*, *Pediastrum*, *Melosira*, *Cyclotella*, *Cryptomonads*, etc. Those assumed to be spheres were the flagellates, *Chroococcus*, *Microcystis*, *Coelastrum*, *Oocystis*, *Planktococcus*, etc. Pennate diatoms, *Crucigenia*, *Scenedesmus* and *Tetraedron* were treated as rectangular solids and *Dinobryon* was assumed to be a cone.

Certain organisms were treated as special exceptions such as the many armed Asterionella. Each arm of this organism was measured separately, averaged and total volume computed by multiplying the number of arms by the average arm volume.

When less than 50 organisms of the same genera were identified, each organism was measured. When numbers were greater than 50, just the organisms found in one-half of a pass (1/4 of total scan) were measured.

Heterocyst counts were made on each cell identified during the total scan.

The phytoplankton data are presented in a number of different categories. Appendix C lists the chronological appearance of the algae genera identified in the water column during each year for each station.

The volumes of the Aphanizomenon, Anabaena, and Microcystis generas present at each station in the water column during each survey from May through October for 1969-1973 are shown in Figure 27.

The graphs in Appendix B which present other limnological data also show a profile of the algae volumes in the water column during each survey.

The average water column phytoplankton volumes for each station during each survey from 1969 through 1973 are shown in Figure 28.

Because the algae floating on the surface usually generate the most complaints about water quality, the surface phytoplankton volumes for each station during each survey are plotted on a year-by-year basis in Figure 29.

Also, a yearly comparison of heterocyst to algae cell ratio in organisms present in the water column at each station during each survey from 1969 to 1973 is shown in Figures 30-32.

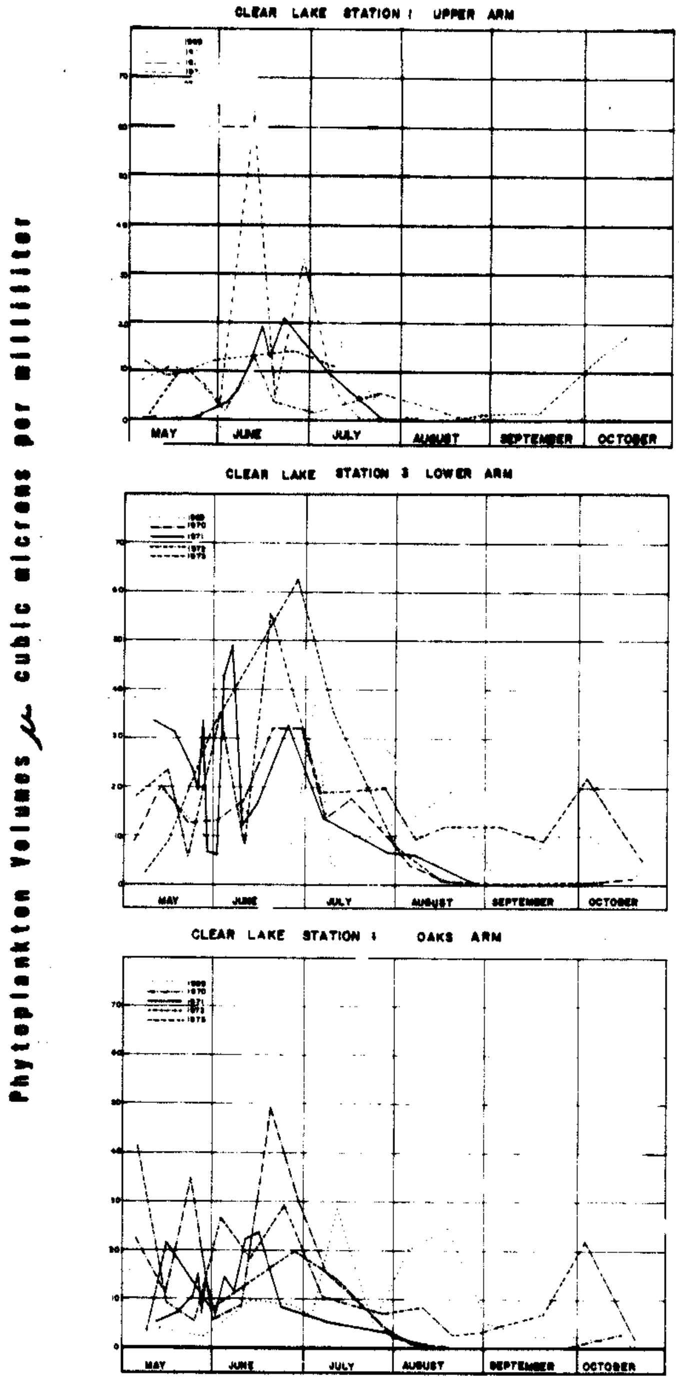
Zooplankton

The Lake County Mosquito Abatement District, in its study of control of the Clear Lake gnat, collected data on the volumes of the zooplankton present in the water column at various stations on the lake. Their methods of obtaining these data were to measure the volumes of zooplankton in a sample that was collected by drawing a plankton net through the entire depth of the water column. The plankton collected were transferred in the laboratory to a 15 ml centrifuge tube, which was then placed in a clinical centrifuge and spun for approximately 2 minutes at 300 R.P.M. This procedure separated the heavier zooplankton from the lighter material present and permitted a measurement of the zooplankton volume.

The zooplankton was then removed from the centrifuge tube and observed through a microscope, where the major genera of zooplankton were identified and their percentage of the zooplankton population were estimated. The zooplankton data collection program began in 1961 and terminated in 1968 and the data are on file at the Lake County Mosquito Abatement District offices in Lakeport.

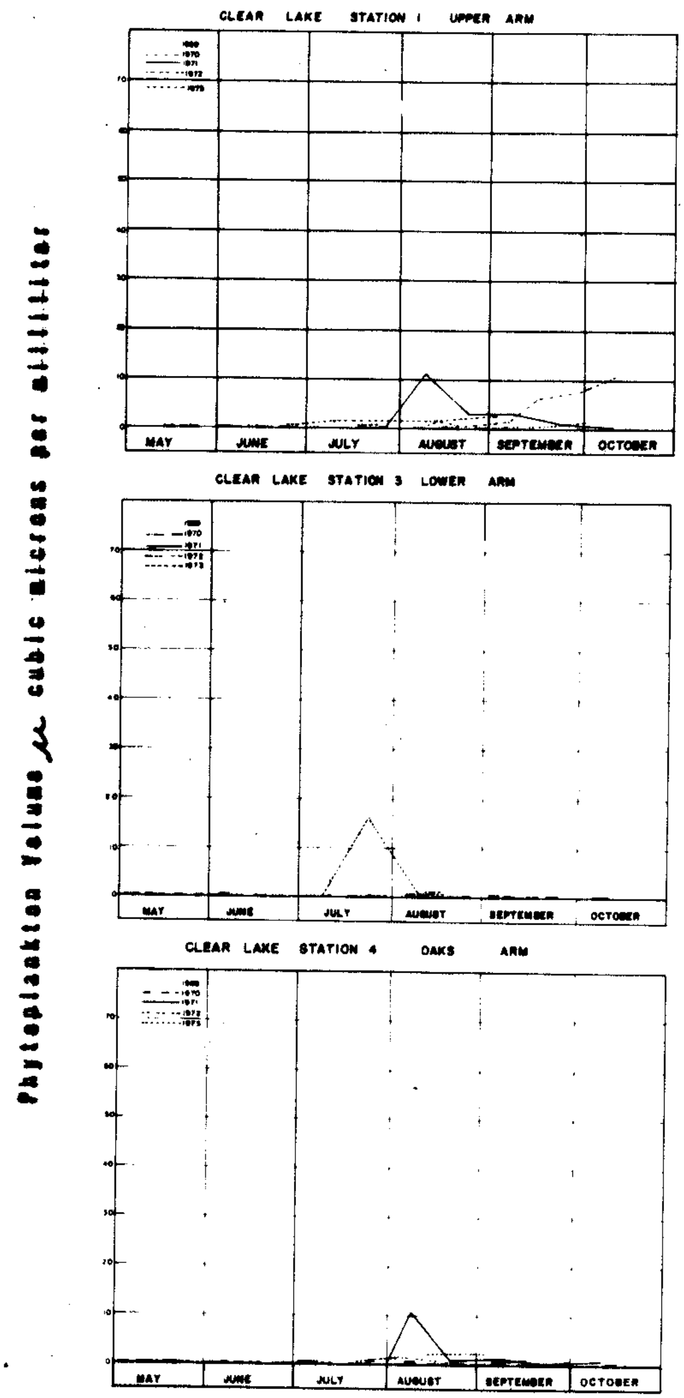
In 1970, the Department began collecting the same type of information using the same methods except for identification of the zooplankton genera present. This data for 1970 through 1973 are presented in Figure 33.

Figure 27



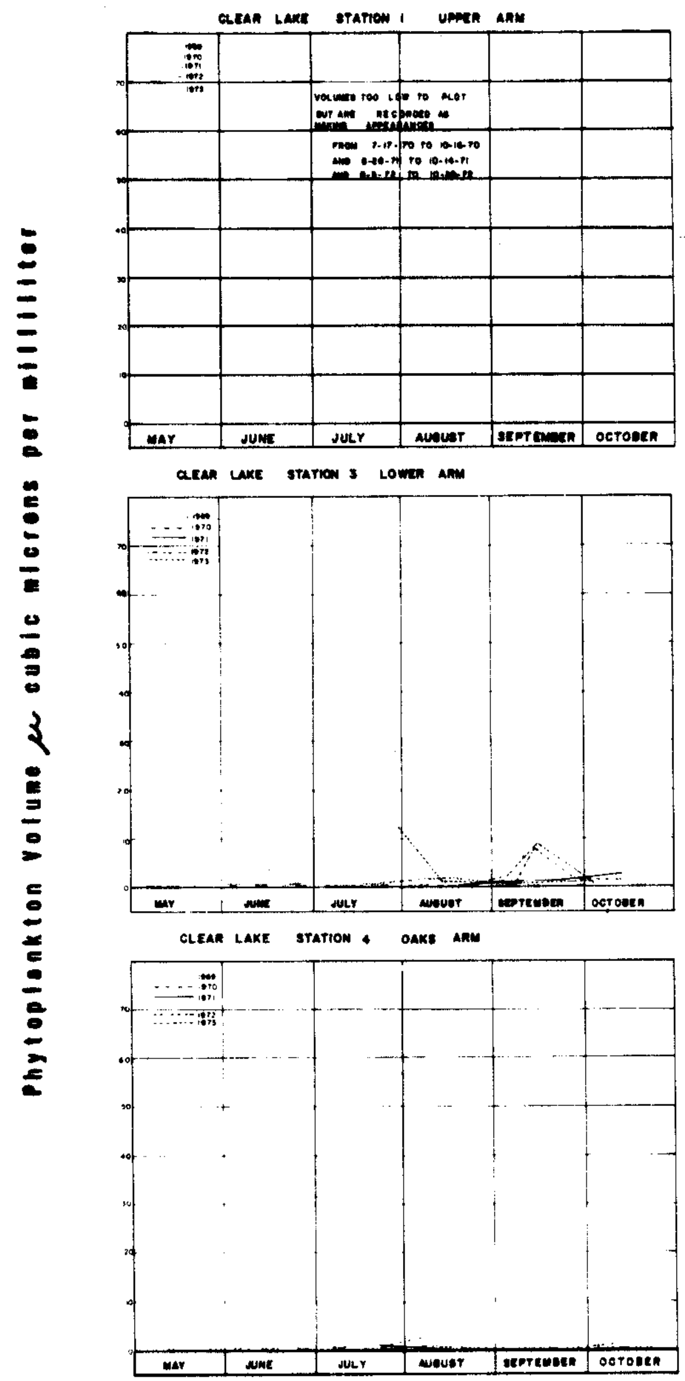
COMPARISON OF APHANIZOMENON VOLUMES

Figure 28



COMPARISON OF ANABAENA VOLUMES

Figure 29



COMPARISON OF MICROCYSTIS VOLUMES

CLEAR LAKE

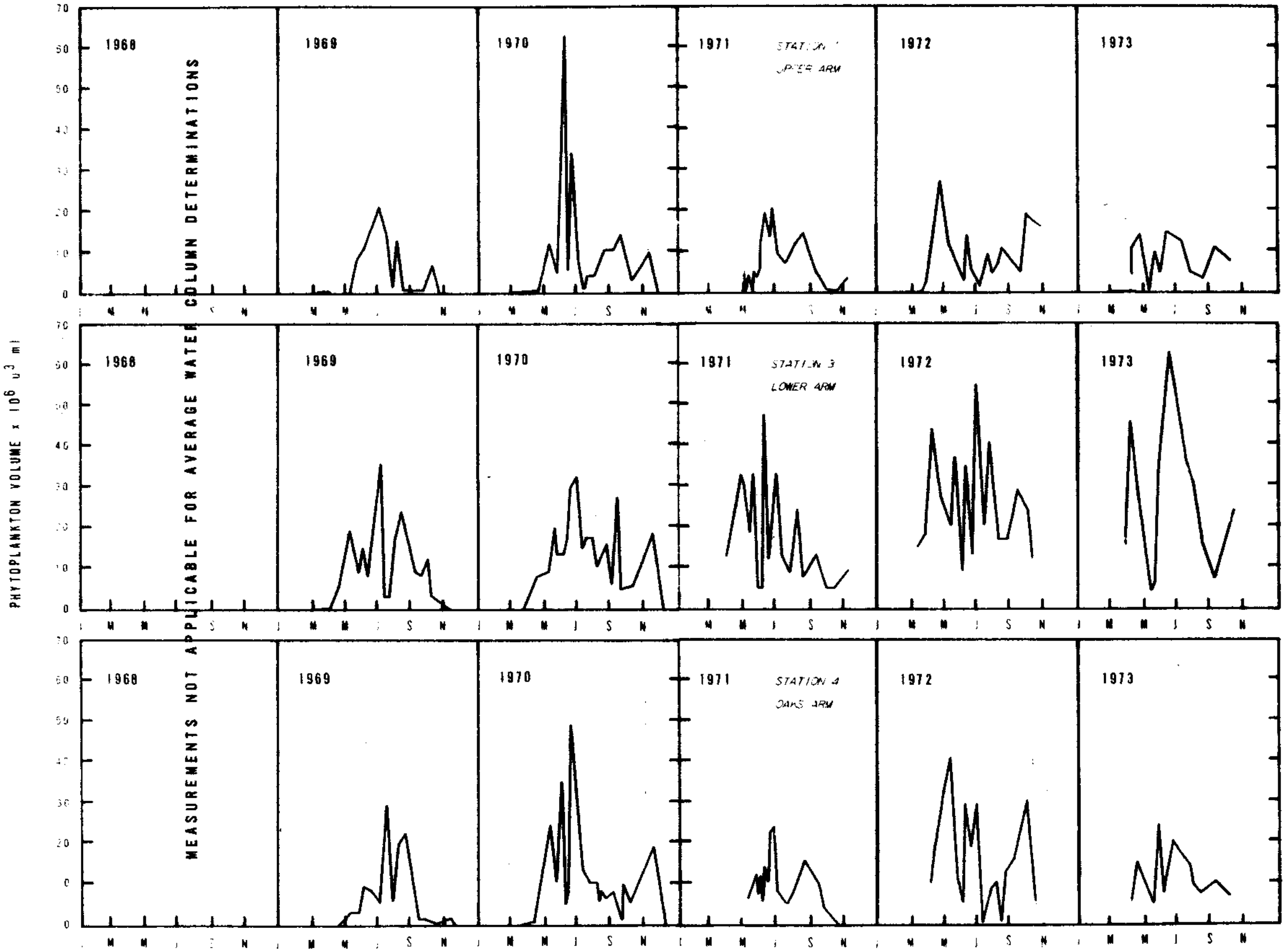


FIG 30 AVERAGE WATER COLUMN PHYTOPLANKTON VOLUMES 1968-73

CLEAR LAKE

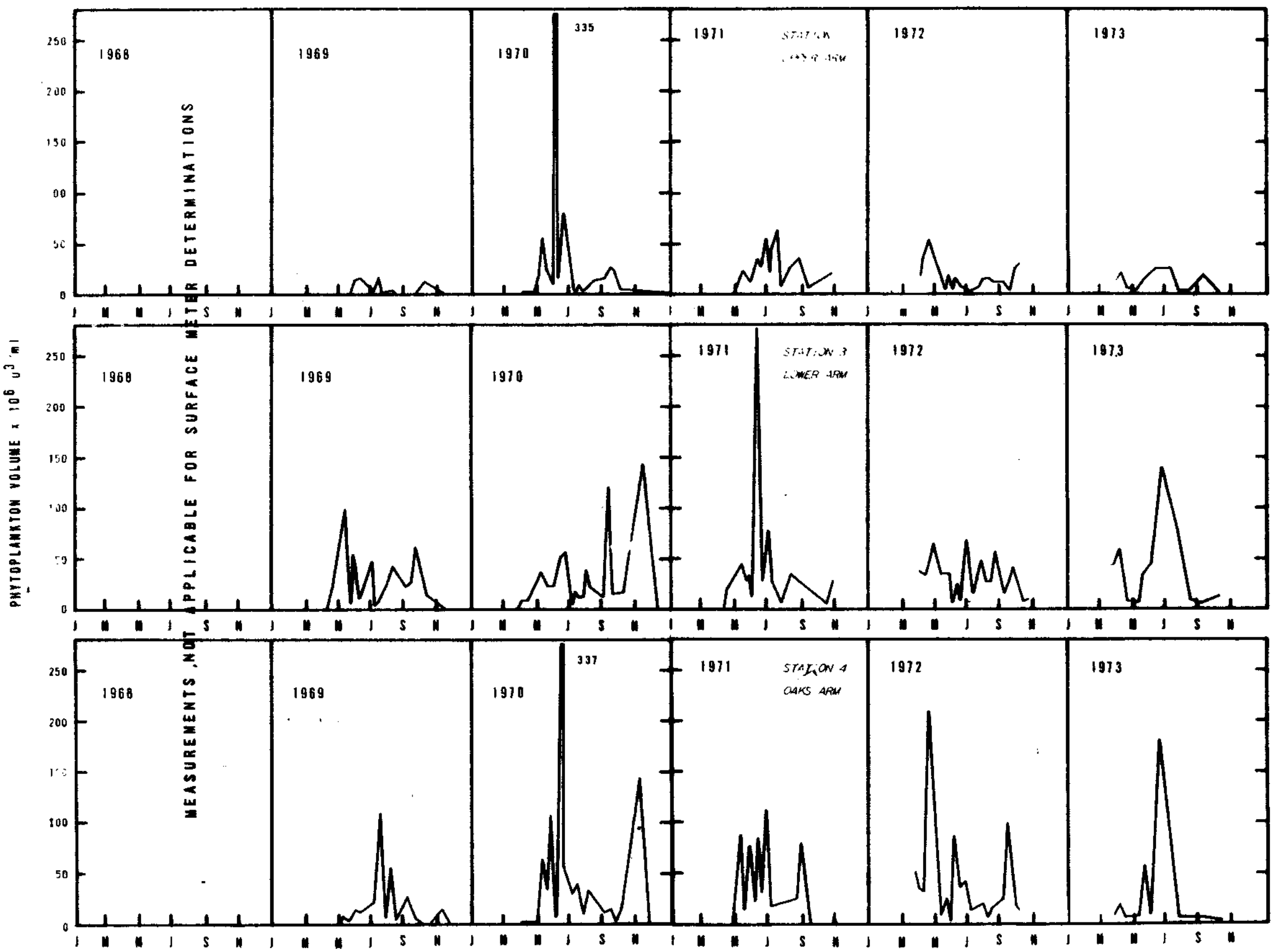


FIG 31 PHYTOPLANKTON VOLUMES MEASURED IN SURFACE METER OF WATER 1968-73

AVERAGE WATER COLUMN HETEROCYST / CELL RATIOS USING APHANIZOMENON

Clear Lake Station 1 Upper Arm

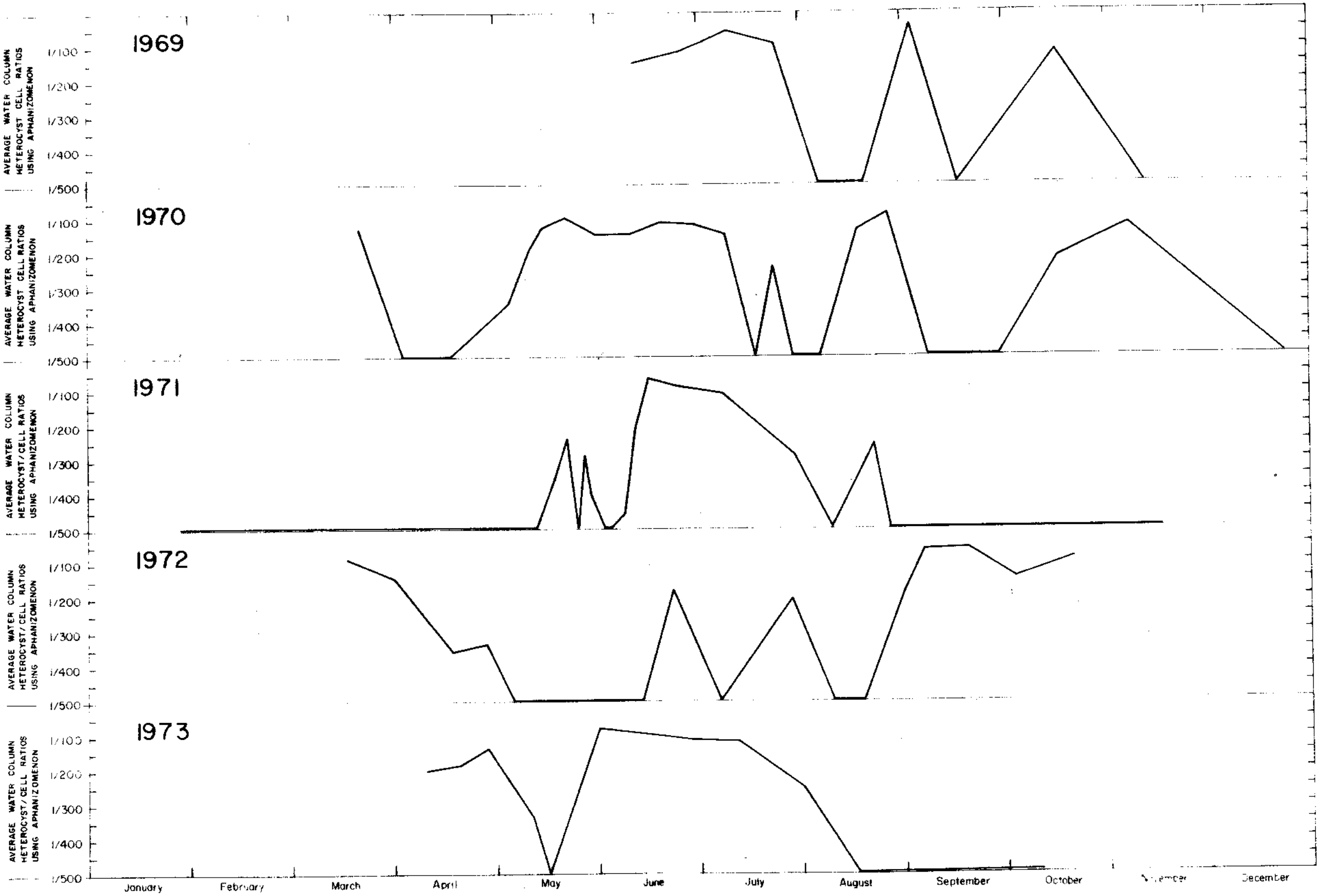


FIGURE 32

AVERAGE WATER COLUMN HETEROCYST / CELL RATIOS USING APHANIZOMENON

Clear Lake Station 3 Lower Arm

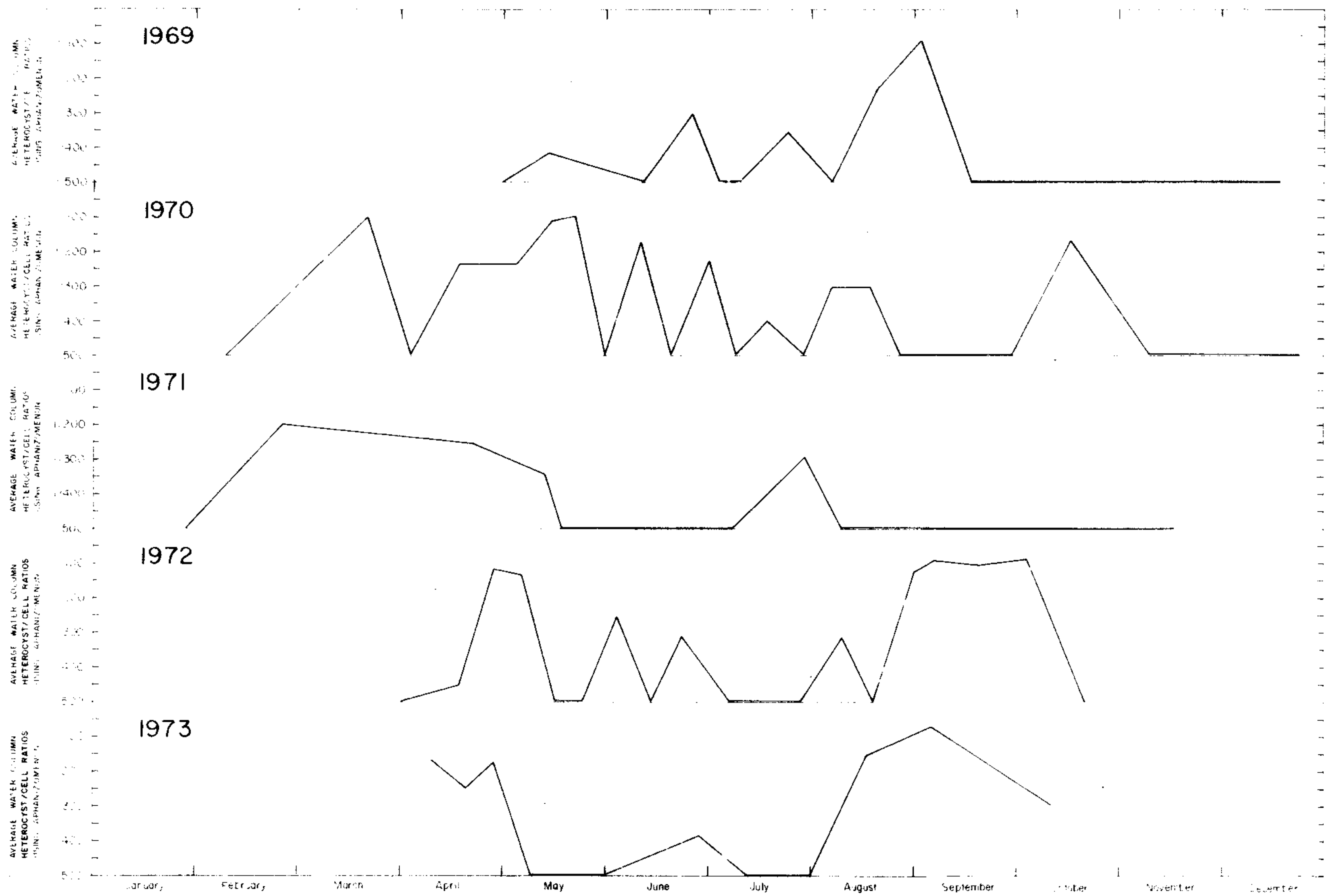


FIGURE 32 cont'

AVERAGE WATER COLUMN HETEROCYST / CELL RATIOS USING APHANIZOMENON

Clear Lake Station 4 Oaks Arm

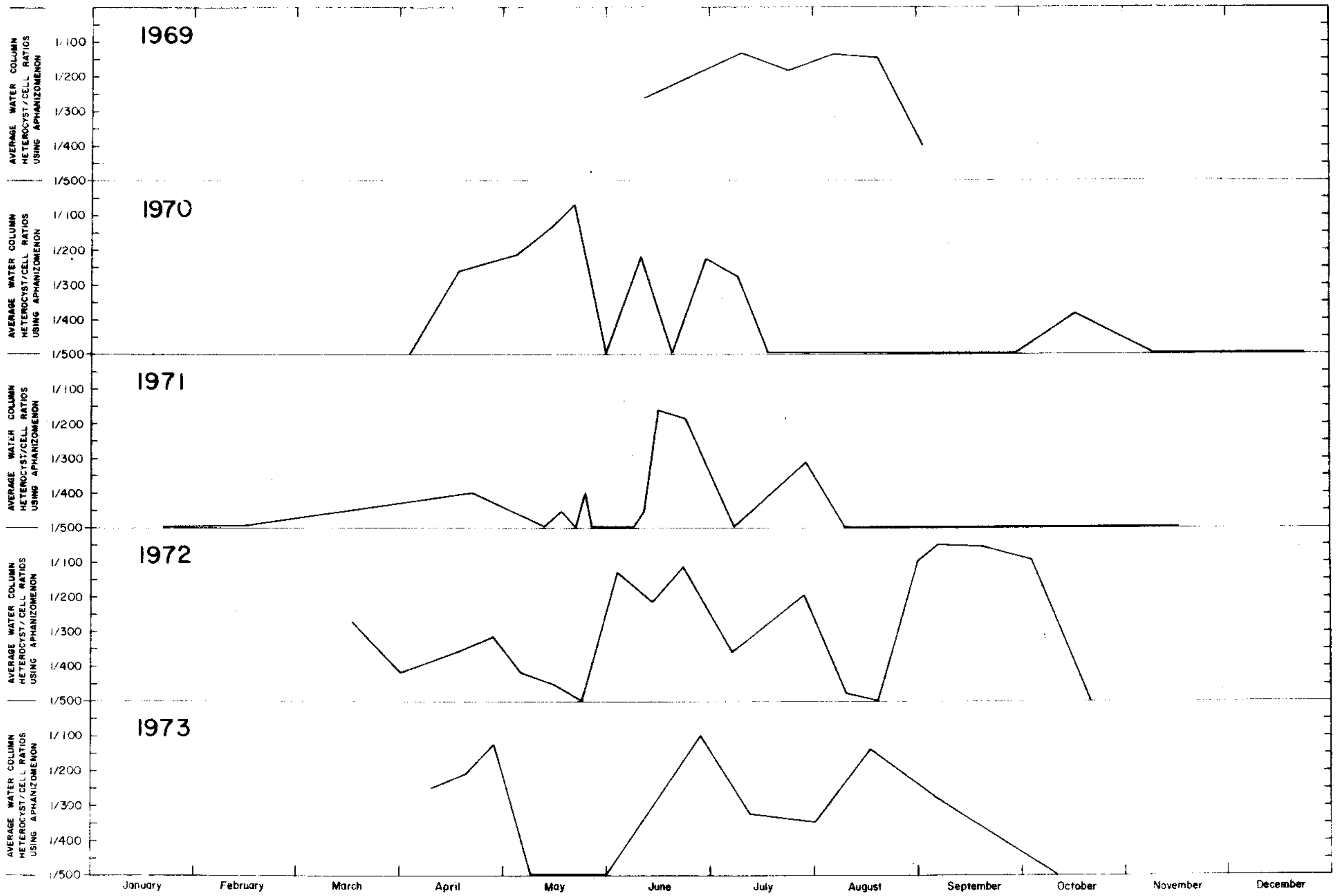


FIGURE 32 cont'

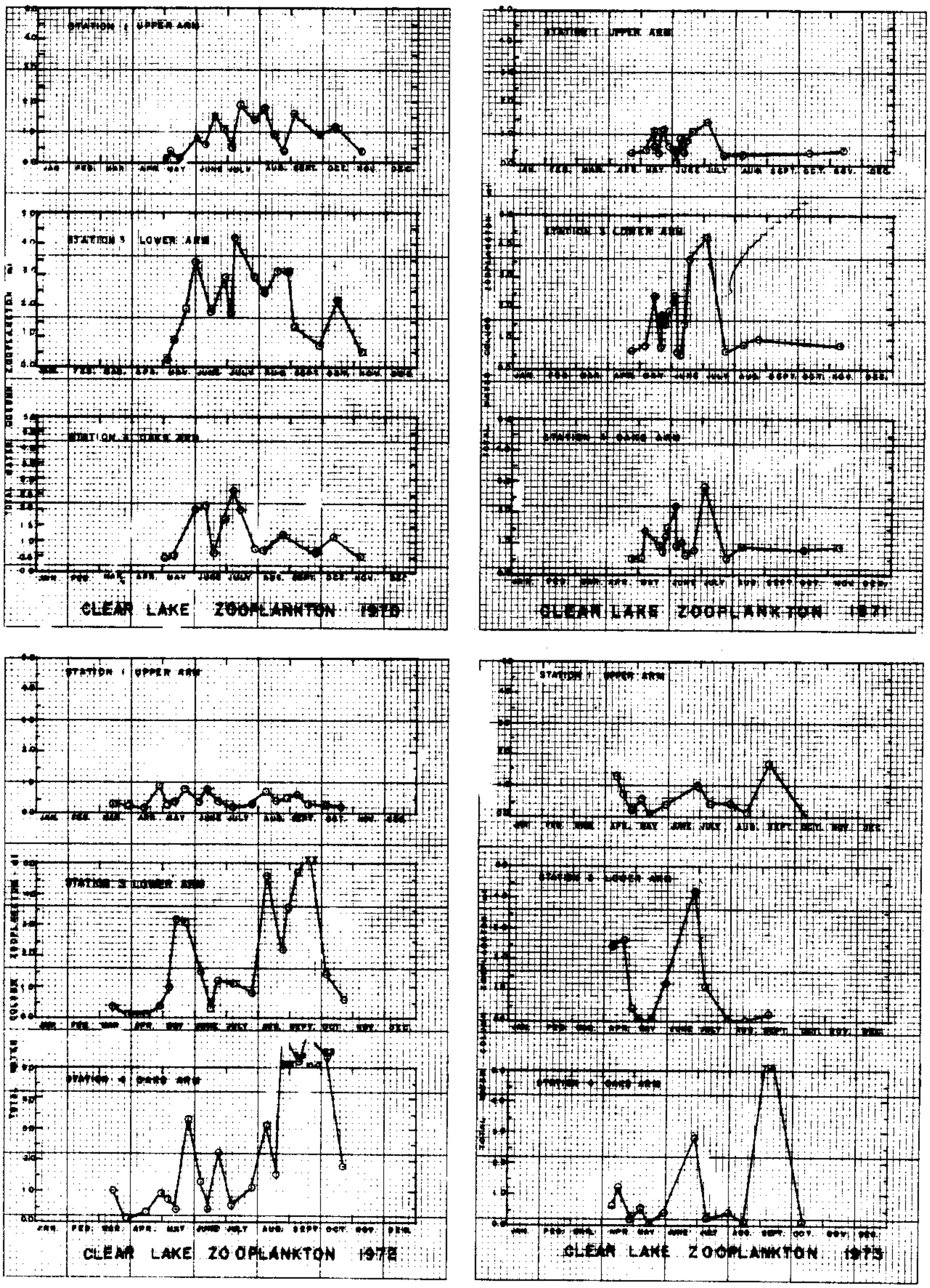


FIG 33 ZOOPLANKTON VOLUMES MEASURED IN TOTAL WATER COLUMN 1970-73

APPENDIX A

HISTORIC AND PRESENT ANALYSES OF VARIOUS CONSTITUENTS IN CLEAR LAKE WATER

MINERAL ANALYSES OF SURFACE WATER

AB L 902.7 254.7 1 CLEAR LAKE AT LAKEPORT

DATE TIME	SAMPLER LAB	G.H. Q DEPTH	DO SAT	TEMP	FIELD LABORATORY	PH	EC	CA	MG	NA	K	CO3	HCO3	SO4	CL	NO3	B	F SIO2	TDS SUM	TH NCH	TURB SAR	REM
05/14/68 1245	5050 5050		11.3 120	67 19	F C	8.4 7.8	256	19 .95 36	15 1.23 46	10 .44 16	1.9 .05 2	0 .00	137 2.25 86	7.4 .15 6	5.9 .17 7	2.7 .04 2	.60	-- 16.0	148 146	108 0	0.4	
09/08/68 1045	5050 5050		6.3 81	80 27	F C	7.9 8.2	278	--	--	11 .48 16	--	0 .00	150 2.46	--	5.8 .16	--	.80	-- --		122	45 0.4	
09/12/68 1130	5050 5050		9.1 112	75 24	F C	8.3 8.0	290	23 1.15 36	18 1.48 46	12 .52 16	2.0 .05 2	0 .00	158 2.59 85	7.6 .16 5	8.4 .24 8	3.4 .05 2	.60	-- --	167 153	130 2	14 0.5	S
10/03/68 1310	5050 5050		6.9 83	73 23	F C	7.8 8.0	284	--	--	11 .48 16	--	0 .00	151 2.47 91	--	6.0 .17 6	5.0 .08 3	.70	-- --		129	0.4	
11/20/68 1120	5050 5050		9.0 87	54 12	F C	7.5 8.4	282	--	--	12 .52 17	--	2.0 .07	158 2.59	--	6.1 .17	2.0 .03	.70	-- --		131	0.5	
12/05/68 0830	5050 5050		8.9 81	49 9	F C	7.8 8.3	284	--	--	11 .48 15	--	0 .00	163 2.67 92	--	6.3 .18 6	2.3 .04 1	.70	-- --		140	0.4	
01/23/69 1430	5050 5050		11.3 96	44 7	F C	7.3 8.0	283	--	--	8.0 .35 15	--	0 .00	111 1.82 92	--	4.5 .13 7	2.0 .03 2	.58	-- --		96	0.4	
02/19/69 1740	5050 5050		10.8 96	47 8	F C	7.4 8.1	286	--	--	8.0 .35 15	--	0 .00	111 1.82 90	--	4.6 .13 6	4.2 .07 3	.40	-- --		101	0.3	
03/12/69 1655	5050 5050		11.5 102	47 8	F C	7.6 7.7	286	--	--	6.4 .28 12	--	0 .00	107 1.75 93	--	4.2 .12 6	1.5 .02 1	.48	-- --		100	0.3	
04/10/69 0815	5050 5050		10.3 99	53 12	F C	7.6 7.6	282	--	--	7.2 .31 15	--	0 .00	108 1.77 92	--	4.6 .13 7	1.9 .03 2	.48	-- --		88	0.3	
05/15/69 0745	5050 5050		10.3 115	66 19	F C	8.2 7.9	213	18 .90 40	12 .99 44	7.2 .31 14	1.2 .03 1	0 .00	115 1.88 86	5.1 .11 5	5.9 .17 8	1.5 .02 1	.50	-- --	86 108	94 1	0.3	T
06/12/69 0900	5050 5050		7.2 83	69 21	F C	7.8 8.0	224	--	--	7.8 .34 14	--	0 .00	121 1.98 92	--	5.5 .16 7	1.0 .02 1	.60	-- --		102	0.3	
07/17/69 1100	5050 5050		8.1 105	80 27	F C	8.2 8.1	231	--	--	8.7 .38 15	--	0 .00	129 2.11 93	--	4.7 .13 6	1.2 .02 1	.58	-- --		110	0.4	
08/07/69 0810	5050 5050		5.5 67	74 23	F C	7.8 8.1	235	--	--	9.0 .39 16	--	0 .00	130 2.13 93	--	4.9 .14 6	1.5 .02 1	.60	-- --		105	0.4	
09/11/69 1130	5050 5050		7.7 90	78 26	F C	7.9 9.1	242	23 1.15 44	13 1.07 41	9.0 .39 15	.1 .00	3.0 .10 4	132 2.16 85	6.9 .14 5	5.2 .15 6	.0 .00	.60	-- --	145 126	110 0	0.4	
10/08/69 1405	5050 5050		10.4 116	66 19	F C	8.2 8.0	256	--	--	8.5 .37 14	--	0 .00	140 2.29 95	--	4.6 .13 5	.1 .00	.70	-- --		112	7E 0.4	N
11/06/69 0800	5050 5050		8.2 82	56 13	F C	7.5 8.1	255	--	--	9.2 .40 15	--	0 .00	144 2.36 93	--	5.9 .17 7	.2 .00	.70	-- --		114	70E 0.4	N
12/04/69 0850	5050 5050		8.4 77	49 9	F C	8.1 7.8	260	--	--	9.2 .40 15	--	0 .00	145 2.38 92	--	6.9 .19 7	1.2 .02 1	.80	-- --		116	50E 0.4	N
01/08/70 1300	5050 5050		11.7 100	44 7	F C	7.8 7.9	240	--	--	9.3 .40 16	--	0 .00	134 2.20 92	--	5.5 .16 7	1.7 .03 1	.70	-- --		107	115E 0.4	N
02/05/70 0835	5050 5050		10.7 96	48 9	F C	7.3 7.5	170	--	--	6.5 .28 15	--	0 .00	101 1.66 92	--	4.5 .13 7	1.4 .02 1	.40	-- --		78	90E 0.3	
02/05/70 0835	5050 5050		10.7 96	48 9	F C	7.3 7.5	170	--	--	6.5 .28 15	--	0 .00	101 1.66 92	--	4.5 .13 7	1.4 .02 1	.40	-- --		78	90E 0.3	N
03/12/70 0935	5050 5050		10.9 102	51 11	F C	7.3 7.7	184	--	--	6.8 .30 16	--	0 .00	96 1.57 91	--	4.2 .12 7	1.6 .03 2	.40	-- --		80	60E 0.3	N
04/09/70 0840	5050 5050		10.0 101	57 14	F C	7.9 7.9	193	--	--	6.0 .26 13	--	0 .00	106 1.74 94	--	3.8 .11 6	.5 .01 1	.40	-- --		91	30E 0.3	N
05/14/70 1030	5050 5050		11.5 124	63 17	F C	8.2 7.9	209	17 .85 38	12 .99 45	7.8 .34 15	1.1 .03 1	0 .00	112 1.84 88	6.2 .13 6	4.0 .11 5	1.2 .02 1	.50	-- --	124 105	90 0	35E 0.4	N S
06/11/70 0630	5050 5050		8.8 105	72 22	F C	8.2 8.2	210	--	--	7.8 .34 15	--	0 .00	119 1.95 95	--	3.5 .10 5	.2 .00	.50	-- --		94	40E 0.4	N
07/09/70 0800	5050 5050		10.6 130	75 24	F C	8.4 7.8	224	--	--	9.3 .40 17	--	0 .00	121 1.98 95	--	3.7 .10 5	.2 .00	.50	-- --		96	9E 0.4	N
08/12/70 1300	5050 5050		8.6 112	81 27	F C	8.4 7.6	229	--	--	8.5 .37 15	--	0 .00	127 2.08 92	--	5.2 .15 7	2.0 .03 1	.70	-- --		102	3E 0.4	N
09/17/70 0725	5050 5050		5.3 59	66 19	F C	8.5 7.6	235	--	--	9.8 .43 17	--	0 .00	132 2.16 94	--	5.2 .15 6	.1 .00	.70	-- --		105	55E 0.4	N
10/22/70 0730	5050 5050		8.1 81	56.3 13.5	F C	8.1 8.1	244	--	--	9.0 .39 15	--	0 .00	136 2.23 93	--	6.0 .17 7	.2 .00	.80	-- --		110	25E 0.4	

MINERAL ANALYSES OF SURFACE WATER

DATE TIME	SAMPLER LAB	G.H. Q DEPTH	DO SAT	TEMP	FIELD LABORATORY PH	EC	CA	MG	NA	K	CO3	HCO3	SO4	CL	NO3	B	F SIO2	TDS SUM	TH NCM	TURB SAR	REM
AA L 902.7 254.7 1 CLEAR LAKE AT LAKEPORT														CONTINUED							
11/12/70	5050		8.2	56.0F	7.4		20	14	9.6	1.9	0	138	5.6	5.4	3.3	.70	--	140	106	40E	
0925	5050		82	13.3C	8.2	243	1.00	1.15	.42	.05	.00	2.26	.12	.15	.05		--	128	0	8.4	
							38	44	16	2		88	5	6	2						
12/10/70	5050		9.0	48.0F	7.4		--	--	7.5	--	0	121	--	5.4	2.4	.70	--		107	60	
0915	5050		81	8.9C	7.8	219			.33		.00	1.98		.15	.04		--			0.3	
									13			91		7	2						
01/07/71	5050		10.6	42.8F	7.0		--	--	7.0	--	0	118	--	5.0	2.8	.60	--		102	55	
1230	5050		89	6.0C	7.7	218			.30		.00	1.93		.14	.05		--			0.3	
									13			91		7	2						
02/04/71	5050		9.0	45 F	7.1		--	--	6.3	--	--	103	--	3.2	2.8	.40	--		85	100E	
0840	5050		78	7 C	7.8	190			.27			1.69		.09	.05		--			0.3	
									14												
03/04/71	5050		10.7	47 F	7.5		--	--	5.8	--	0	114	--	4.0	2.6	.50	--		96	80F	
0845	5050		95	8 C	7.6	208			.25		.00	1.87		.11	.04		--			0.3	
									12			93		5	2						
04/08/71	5050		9.2	51 F	7.4		21	9.8	7.1	2.0	0	113	6.1	3.8	2.7	.50	--	134	93	45E	
0830	5050		86	11 C	7.7	206	1.05	.81	.31	.05	.00	1.85	.13	.11	.04		--	109	1	0.3	
							47	36	14	2		87	6	5	2						
05/05/71	5050		9.0	57 F	7.5		--	--	8.5	--	0	119	--	3.8	2.5	.40	--		93	30E	
0730	5050		91	14 C	7.6	211			.37		.00	1.95		.11	.04		--			0.4	
									17			93		5	2						
06/24/71	5050		9.7	66 F	8.1		--	--	8.7	--	0	128	--	5.5	.1	.50	--		103	20F	
0755	5050		109	19 C	8.3	226			.38		.00	2.10		.16	.00		--			0.4	
									16			93		7							
07/22/71	5050		8.6	76.1F	8.3		--	--	9.1	--	0	136	--	4.8	.0	.60	--		108	14F	
0935	5050		107	24.5C	8.3	231			.40		.00	2.20		.14	.00		--			0.4	
									16			96		6							
08/19/71	5050		10.5	76.1F	8.4		--	--	9.6	--	0	135	--	5.4	.7	.90	--		110	7E	
0840	5050		130	24.5C	8.0	241			.42		.00	2.21		.15	.01		--			0.4	
									16			93		6							
09/16/71	5050		11.2	72 F	8.4		--	--	9.6	--	4.0	128	--	5.5	.1	.70	--		115	5E	
0855	5050		133	22 C	8.6	245			.42		.13	2.10		.16	.00		--			0.4	
									15												
10/21/71	5050		8.5	61.7F	8.1	252	--	--	9.7	--	0	140	--	7.1	2.2	.70	--		114	15F	
1330	5050		91	16.5C	7.8	261			.42		.00	2.29		.20	.04		--			0.4	
									16			91		8	2						
11/12/71	5050		8.9	51.8F	7.4	250	--	--	--	--	--	--	--	--	--	--	--			44A	
0930			86	11.0C													--				
12/16/71	5050		10.1	42.8F	7.5	253	--	--	--	--	--	--	--	--	--	--	--			21A	
0845			95	6.0C													--				
01/13/72	5050		10.6	41.9F	7.5	261	--	--	--	--	--	--	--	--	--	--	--			17A	
0910			88	5.5C													--				
02/10/72	5050		11.0	44.6F	7.4	265	--	--	10	--	0	139	--	7.1	3.8	.70	--		110	9A	
0910	5050		94	7.0C	7.7	252			.44		.00	2.28		.20	.06		--			0.4	
									17			90		8	2						
03/09/72	5050		8.1	5[illegible] F	7.2	239	--	--	--	--	--	--	--	--	--	--	--			35A	
0915			75	1[illegible] C													--				
04/13/72	5050		7.5	53.6F	7.6	249	--	--	4.0	--	0	135	--	4.8	--	.70	--		110	18A	
0915	5050		92	12.0C	7.7	251			.17		.00	2.21		.14			--			0.2	
									7												
05/04/72	5050		13.4	64 F	8.4	249	--	--	--	--	--	--	--	--	--	--	--			5A	
1100			147	18 C													--				
06/08/72	5050		6.6	68.0F	7.5	289	--	--	10	--	0	137	--	4.8	2.4	.80	--		115	9A	
0740	5050		75	20.0C	7.5	265			.44		.00	2.25		.14	.04		--			0.4	
									16			93		6	2						
07/14/72	5050		5.7	79.7F	7.8	272	--	--	--	--	--	--	--	--	--	--	--			3A	
1000			73	26.5C													--				
08/04/72	5050		7.5	75 F	8.1	270	--	--	--	--	--	--	--	--	--	--	--			7A	
0803			92	24 C													--				
09/15/72	5050		9.2	72 F	8.2	267	--	--	--	--	--	--	--	--	--	--	--			24A	
1045			109	22 C													--				
10/05/72	5050		5.6	64.4F	7.6	295	--	--	12	--	0	167	--	7.8	--	1.10	--		131	25A	
0745	5050		55	18.0C	7.8	295			.52		.00	2.74		.27			--			0.5	
									17												
11/16/72	5050		4.8	50.0F	7.7	263	--	--	--	--	--	--	--	--	--	--	--			46AF	
1100	5050		50	10.0C													--				

MINERAL ANALYSES OF SURFACE WATER

AR L 902.7 254.7 1 CLEAR LAKE AT LAKEPORT

DATE TIME	SAMPLER LAB	G.H. Q DEPTH	DO SAT	TEMP	FIELD LABORATORY PH	EC	CA	MG	NA	K	CO3	HCO3	SO4	CL	NO3	B	F SIO2	TDS SUM	TH NCH	TURB SAR	REM
05/14/68 1245	5050 5050		11.3 128	67 F 19 C	8.4 7.8	256	19 .95 36	15 1.23 46	10 .44 16	1.9 .05 2	0 .00	137 2.25 86	7.4 .15 6	5.9 .17 7	2.7 .04 2	.60	-- 16.0	144 146	108 0	 0.4	
08/08/68 1045	5050 5050		6.3 81	80 F 27 C	7.9 8.2	278	--	--	11 .48 16	--	0 .00	150 2.46	--	5.8 .16	--	.80	-- --		122	45 0.4	
09/12/68 1130	5050 5050		9.1 112	75 F 24 C	8.3 8.0	290	23 1.15 38	18 1.48 46	12 .52 16	2.0 .05 2	0 .00	158 2.59 85	7.6 .16 5	8.4 .24 8	3.4 .05 2	.60	-- --	167 153	138 2	14 0.5	5
10/03/68 1310	5050 5050		6.9 83	73 F 23 C	7.8 8.0	284	--	--	11 .48 16	--	0 .00	151 2.47 91	--	6.0 .17 6	5.0 .08 3	.70	-- --		129	 0.4	
11/20/68 1120	5050 5050		9.0 87	54 F 12 C	7.5 8.4	282	--	--	12 .52 17	--	2.0 .07	158 2.59	--	6.1 .17	2.0 .03	.70	-- --		131	 0.5	
12/05/68 0830	5050 5050		8.9 81	49 F 9 C	7.8 8.3	284	--	--	11 .48 15	--	0 .00	163 2.67 92	--	6.3 .18 6	2.3 .04 1	.70	-- --		140	 0.4	
01/23/69 1430	5050 5050		11.3 96	44 F 7 C	7.3 8.0	203	--	--	8.0 .35 15	--	0 .00	111 1.82 92	--	4.5 .13 7	2.0 .03 2	.50	-- --		96	 0.4	
02/19/69 1740	5050 5050		10.8 96	47 F 8 C	7.4 8.1	206	--	--	8.0 .35 15	--	0 .00	111 1.82 90	--	4.6 .13 6	4.2 .07 3	.40	-- --		101	 0.3	
03/12/69 1655	5050 5050		11.5 102	47 F 8 C	7.6 7.7	206	--	--	6.4 .28 12	--	0 .00	107 1.75 93	--	4.2 .12 6	1.5 .02 1	.40	-- --		100	 0.3	
04/10/69 0815	5050 5050		10.3 99	53 F 12 C	7.6 7.6	202	--	--	7.2 .31 15	--	0 .00	108 1.77 92	--	4.6 .13 7	1.9 .03 2	.40	-- --		88	 0.3	
05/15/69 0745	5050 5050		10.3 115	66 F 19 C	8.2 7.9	213	18 .90 40	12 .99 44	7.2 .31 14	1.2 .03 1	0 .00	115 1.88 86	5.1 .11 5	5.9 .17 8	1.5 .02 1	.50	-- --	86 108	94 1	 0.1	T
06/12/69 0900	5050 5050		7.2 83	69 F 21 C	7.8 8.0	224	--	--	7.8 .34 14	--	0 .00	121 1.98 92	--	5.5 .16 7	1.0 .02 1	.60	-- --		102	 0.1	
07/17/69 1100	5050 5050		8.1 105	80 F 27 C	8.2 8.1	231	--	--	8.7 .38 15	--	0 .00	129 2.11 93	--	4.7 .13 6	1.2 .02 1	.50	-- --		110	 0.4	
08/07/69 0810	5050 5050		5.5 67	74 F 23 C	7.8 8.1	235	--	--	9.0 .39 16	--	0 .00	130 2.13 93	--	4.9 .14 6	1.5 .02 1	.60	-- --		105	 0.4	
09/11/69 1130	5050 5050		7.7 98	78 F 26 C	7.9 9.1	242	23 1.15 44	13 1.07 41	9.0 .39 15	.1 .00	3.0 .10 4	132 2.16 85	6.9 .14 5	5.2 .15 6	.0 .00	.60	-- --	145 126	110 0	 0.4	
10/08/69 1405	5050 5050		10.4 116	66 F 19 C	8.2 8.0	256	--	--	8.5 .37 14	--	0 .00	140 2.29 95	--	4.6 .13 5	.1 .00	.70	-- --		112	7F 0.4	N
11/06/69 0800	5050 5050		8.2 82	56 F 13 C	7.5 8.1	255	--	--	9.2 .40 15	--	0 .00	144 2.36 93	--	5.9 .17 7	.2 .00	.70	-- --		114	70F 0.4	N
12/04/69 0850	5050 5050		8.4 77	49 F 9 C	8.1 7.8	260	--	--	9.2 .40 15	--	0 .00	145 2.38 92	--	6.9 .19 7	1.2 .02 1	.80	-- --		116	50E 0.4	N
01/08/70 1300	5050 5050		11.7 100	44 F 7 C	7.8 7.9	240	--	--	9.3 .40 16	--	0 .00	134 2.20 92	--	5.5 .16 7	1.7 .03 1	.70	-- --		107	115F 0.4	N
02/05/70 0835	5050 5050		10.7 96	48 F 9 C	7.3 7.5	170	--	--	6.5 .28 15	--	0 .00	101 1.66 92	--	4.5 .13 7	1.4 .02 1	.40	-- --		78	90E 0.3	
02/05/70 0835	5050 5050		10.7 96	48 F 9 C	7.3 7.5	170	--	--	6.5 .28 15	--	0 .00	101 1.66 92	--	4.5 .13 7	1.4 .02 1	.40	-- --		78	90F 0.3	N
03/12/70 0935	5050 5050		10.9 102	51 F 11 C	7.3 7.7	184	--	--	6.8 .30 16	--	0 .00	96 1.57 91	--	4.2 .12 7	1.6 .03 2	.40	-- --		80	60E 0.3	N
04/09/70 0840	5050 5050		10.0 101	57 F 14 C	7.9 7.9	193	--	--	6.0 .26 13	--	0 .00	106 1.74 94	--	3.8 .11 6	.5 .01 1	.40	-- --		91	30E 0.3	N
05/14/70 1030	5050 5050		11.5 124	63 F 17 C	8.2 7.9	209	17 .85 38	12 .99 45	7.8 .34 15	1.1 .03 1	0 .00	112 1.84 88	6.2 .13 6	4.0 .11 5	1.2 .02 1	.50	-- --	124 105	90 0	35F 0.4	N S
06/11/70 0630	5050 5050		8.8 105	72 F 22 C	8.2 8.2	210	--	--	7.8 .34 15	--	0 .00	119 1.95 95	--	3.5 .10 5	.2 .00	.50	-- --		94	40F 0.4	N
07/09/70 0800	5050 5050		10.6 130	75 F 24 C	8.4 7.8	224	--	--	9.3 .40 17	--	0 .00	121 1.98 95	--	3.7 .10 5	.2 .00	.50	-- --		96	9F 0.4	N
08/12/70 1300	5050 5050		8.6 112	81 F 27 C	8.4 7.6	229	--	--	8.5 .37 15	--	0 .00	127 2.08 92	--	5.2 .15 7	2.0 .03 1	.70	-- --		102	3E 0.4	N
09/17/70 0725	5050 5050		5.3 59	66 F 19 C	8.5 7.6	235	--	--	9.8 .43 17	--	0 .00	132 2.16 94	--	5.2 .15 6	.1 .00	.70	-- --		105	55E 0.4	N
10/22/70 0730	5050 5050		8.1 81	56.3F 13.5C	8.1 8.1	244	--	--	9.0 .39 15	--	0 .00	136 2.23 93	--	6.0 .17 7	.2 .00	.80	-- --		110	25E 0.4	

MINERAL ANALYSES OF SURFACE WATER

AB 135.00 CACHE CREEK NEAR LOWER LAKE - OUTLET OF CLEAR LAKE

DATE TIME	SAMPLER LAB	G.H. Q DEPTH	DO SAT	TEMP	FIELD LABORATORY PH	EC	CA	MG	NA	K	CO3	HCO3	SO4	CL	NO3	B	F SIO2	TDS SUM	TH NCH	TURB SAR	REM
							MINERAL CONSTITUENTS IN		MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE							MILLIGRAMS PER LITER					
05/14/68 1350	5050 5050	2.99 210	9.8 101	63 F 17 C	8.0 8.0	278	21 1.05 36	16 1.32 46	11 .48 17	2.0 .05 2	0 .00	152 2.49 87	7.4 .15 5	6.5 .18 6	2.3 .04 1	.80	-- 18.0	161 160	128 0	 0.4	
08/08/68 1200	5050 5050	3.30 285	8.0 99	80 F 27 C	8.4 8.4	288	--	--	12 .52 17	--	2.0 .07	154 2.52	--	6.2 .17	--	.90	-- --		128	30 0.5	
09/12/68 1330	5050 5050	2.60 148	8.9 104	74 F 23 C	8.4 8.1	299	24 1.20 37	17 1.40 43	13 .57 18	2.5 .06 2	0 .00	159 2.61 82	9.2 .19 6	9.0 .25 8	7.8 .13 4	1.00	-- --	192 162	130 0	15 0.5	
10/03/68 1415	5050 5050	2.00 101	8.6 95	69 F 21 C	8.0 8.0	306	--	--	12 .52 16	--	0 .00	161 2.64 91	--	6.2 .17 6	6.5 .10 3	1.00	-- --		134	20 0.5	
11/20/68 1220	5050 5050	0.33 2.2	10.1 95	55 F 13 C	7.6 7.8	299	--	--	12 .52 16	--	0 .00	159 2.61 91	--	6.5 .18 6	5.8 .09 3	.80	-- --		135	8 0.4	
12/05/68 0920	5050 5050	0.30 1.8	9.8 82	46 F 8 C	7.9 8.1	310	--	--	13 .57 16	--	0 .00	170 2.79 98	--	7.2 .20 6	6.5 .10 3	.80	-- --		147	20 0.5	
01/23/69 1525	5050 5050	6.80 3120	11.5 91	42 F 6 C	7.3 8.1	261	--	--	11 .48 17	--	0 .00	141 2.31 90	--	6.0 .17 7	4.8 .08 3	.80	-- --		115	140 0.4	
02/19/69 1540	5050 5050	7.14 3620	12.0 101	46 F 8 C	7.9 8.1	264	--	--	11 .48 16	--	0 .00	146 2.39 92	--	6.1 .17 7	2.9 .05 2	.80	-- --		123	35 0.4	
03/12/69 1545	5050 5050	6.71 2900	12.0 99	45 F 7 C	7.5 8.2	253	--	--	8.4 .37 14	--	0 .00	136 2.23 94	--	5.2 .15 6	.0 .00	.70	-- --		118	35 0.3	
04/10/69 0930	5050 5050	4.77 1060	10.9 103	55 F 13 C	7.5 7.5	252	--	--	9.7 .42 16	--	0 .00	135 2.21 91	--	6.8 .19 8	2.5 .04 2	.80	-- --		110	30 0.4	
05/15/69 0915	5050 5050	3.56 456 AB 1350.00	9.2 103	70 F 21 C	8.1 7.5	250	20 1.00 37	15 1.23 46	9.2 .40 15	1.9 .05 2	0 .00	133 2.18 82	12 .25 9	6.9 .19 7	2.9 .05 2	.70	-- --	131 134	112 3	25 0.4	
06/12/69 1015	5050 5050	3.19 338	8.8 100	72 F 22 C	7.5 7.7	248	--	--	9.2 .40 15	--	0 .00	135 2.21 90	--	6.4 .18 7	3.5 .06 2	.70	-- --		112	25 0.4	
07/17/69 1200	5050 5050	3.89 586	7.8 97	81 F 27 C	8.3 8.3	243	--	--	9.4 .41 16	--	0 .00	134 2.20 92	--	5.0 .14 6	3.1 .05 2	.70	-- --		110	45 0.4	
08/07/69 0910	5050 5050	3.68 502	8.1 98	78 F 26 C	8.4 8.3	266	--	--	9.8 .43 16	--	0 .00	137 2.25 93	--	5.2 .15 6	1.8 .03 1	.70	-- --		112	35 0.4	
09/11/69 1225	5050 5050	2.75 231	8.3 101	78 F 26 C	8.1 8.3	245	20 1.00 41	12 .99 40	9.7 .42 17	1.8 .05 2	0 .00	133 2.18 88	5.9 .12 5	5.5 .16 6	.7 .01	.80	-- --	112 122	100 0	2 0.4	
10/09/69 0740	5050 5050	1.96 97	9.3 93	60 F 16 C	7.5 7.7	276	--	--	9.4 .41 15	--	0 .00	149 2.44 94	--	5.2 .15 6	.5 .01	.80	-- --		120	4F 0.4	
12/04/69 1010	5050 5050	0.37 3.3	10.4 85	44 F 7 C	8.1 7.7	306	--	--	12 .52 16	--	0 .00	161 2.64 86	--	9.6 .27 9	3.7 .06 2	1.10	-- --		134	5E 0.5	
01/08/70 1350	5050 5050	0.43 4.2	11.2 90	43 F 6 C	7.1 7.4	208	--	--	9.4 .41 20	--	0 .00	97 1.59 98	--	6.3 .18 10	2.7 .04 2	.50	-- --		84	50E 0.4	
02/05/70 0940	5050 5050	 3690	9.8 85	49 F 9 C	7.3 7.5	242	--	--	9.8 .43 16	--	0 .00	142 2.33 92	--	6.2 .17 7	2.4 .04 2	.80	-- --		109	35F 0.4	
03/12/70 1040	5050 5050	4.00 630	11.8 107	52 F 11 C	7.4 7.7	238	--	--	9.2 .40 16	--	0 .00	132 2.16 93	--	5.1 .14 6	2.1 .03 1	.70	-- --		104	40E 0.4	
04/09/70 0935	5050 5050	1.95 117	10.6 103	54 F 14 C	7.7 7.9	280	--	--	12 .52 17	--	0 .00	142 2.33 92	--	7.0 .20 8	.1 .00	.60	-- --		124	30E 0.5	
05/14/70 1145	5050 5050	3.24 358	10.6 107	61 F 16 C	8.0 8.3	235	21 1.05 42	12 .99 39	10 .44 17	1.7 .04 2	0 .00	131 2.15 85	7.7 .16 6	6.0 .17 7	2.3 .04 2	.80	-- --	143 126	102 0	45E 0.4	
06/11/70 0800	5050 5050	3.16 330	9.1 98	67 F 19 C	7.8 7.8	238	--	--	9.1 .40 16	--	0 .00	132 2.16 94	--	4.5 .13 6	.3 .00	.70	-- --		102	45E 0.4	
07/09/70 0930	5050 5050	3.75 530	7.8 94	77 F 25 C	7.6 8.0	242	--	--	10 .44 17	--	0 .00	131 2.15 92	--	4.0 .11 5	4.4 .07 3	.60	-- --		106	15E 0.4	
08/12/70 1440	5050 5050	3.57 460	7.5 94	82 F 28 C	8.4 8.0	239	--	--	9.1 .40 16	--	0 .00	131 2.15 91	--	5.0 .14 6	3.9 .06 3	.80	-- --		104	10E 0.4	
09/17/70 0820	5050 5050	2.85 254	8.6 94	68 F 20 C	8.4 7.6	252	--	--	11 .48 17	--	0 .00	134 2.20 93	--	5.9 .17 7	.2 .00	.90	-- --		116	35E 0.4	
10/22/70 0835	5050 5050	1.14 21	10.1 99	58.1F 14.5C	7.8 7.8	265	--	--	9.7 .42 15	--	0 .00	148 2.43 93	--	6.4 .18 7	.2 .00	1.80	-- --		119	18E 0.4	
11/12/70 1050	5050 5050	0.83 2.6	11.3 101	51.0F 10.5C	7.3 8.1	311	22 1.10 34	18 1.48 46	14 .61 19	2.7 .07 2	0 .00	153 2.51 78	11 .23 7	15 .42 13	3.2 .05 2	1.20	-- --	194 162	130 4	4E 0.5	
12/10/70 1030	5050 5050	0.48 [illegible]	10.9 94	48.0F 9.0C	7.3 7.7	196	--	--	8.5 .37 18	--	0 .00	86 1.41	--	6.4 .18	--	.50	-- --		80	40E 0.4	

MINERAL ANALYSES OF SURFACE WATER

AB 135.00 CACHE CREEK NEAR LOWER LAKE - OUTLET OF CLEAR LAKE

CONTINUED

DATE TIME	SAMPLER LAB	G.H. Q DEPTH	DO SAT	TEMP	FIELD LABORATORY PH	EC	CA	MG	NA	K	CO3	HCO3	SO4	CL	NO3	B	F SIO2	TDS SUM	TH NCH	TURB SAR	REM
							MINERAL CONSTITUENTS IN		MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE							MILLIGRAMS PER LITER					
01/07/71 1345	5050 5050	0.56 3.2	10.1 83	44.6F 7.0C	7.1 7.7	247	--	--	9.6 .42 16	--	0 .00	135 2.21	--	6.7 .19	--	.90	-- --		110	25F 0.4	
02/04/71 1000	5050 5050	0.72 6.2	11.5 98	47 F 8 C	7.6 7.7	256	--	--	10 .44 15	--	0 .00	139 2.28	--	6.6 .19	--	.90	-- --		128	25E 0.4	
03/04/71 0945	5050 5050	0.70 5.8	11.4 97	47 F 8 C	7.8 7.6	292	--	--	9.6 .42 14	--	0 .00	146 2.39	--	5.5 .16	--	.60	-- --		130	20E 0.4	
04/08/71 0945	5050 5050	0.60 3.9	10.3 102	59 F 15 C	8.0 7.8	248	--	--	9.8 .43 17	--	0 .00	138 2.26	--	5.1 .14	--	.80	-- --		105	20E 0.4	
05/05/71 0830	5050 5050	2.56 180	9.5 93	58 F 14 C	7.4 7.4	250	--	--	7.7 .33 13	--	0 .00	134 2.20	--	3.9 .11	--	.80	-- --		114	25E 0.3	
06/24/71 0825	5 5 5050	6.93 3060	8.8 103	74.3F 23.5C	7.6 8.0	259	--	--	9.6 .42 16	--	0 .00	134 2.20	--	5.6 .16	--	.70	-- --		112	30F 0.4	
07/22/71 1115	5050 5050	4.09 650	7.9 98	81 F 27 C	7.8 7.9	260	20 1.00 40	13 1.07 43	8.4 .37 15	1.8 .05 2	0 .00	129 2.11 88	7.1 .15 6	4.5 .13 5	.2 .00	.70	-- --	148 119	105 0	4F 0.4	
08/19/71 0945	5050 5050	3.58 490	9.0 110	79 F 26 C	8.4 8.1	247	--	--	9.8 .43 16	--	0 .00	138 2.26	--	5.6 .16	--	1.00	-- --		112	20F 0.4	
09/16/71 0910	5050 5050	3.04 335	8.2 96	77 F 25 C	8.2 8.1	258	--	--	11 .48 17	--	0 .00	144 2.36	--	6.7 .19	--	.80	-- --		117	20F 0.4	
10/21/71 1430	5050 5050	1.07 32	9.5 94	59.4F 15.2C	8.1 7.9	252 277	--	--	9.7 .42 14	--	0 .00	157 2.57	--	9.5 .27	--	.90	-- --		127	15E 0.4	
11/12/71 1030	5050 5050	0.34 1.0	9.7 85	49.1F 9.5C	7.4 7.8	286	23 1.15 37	17 1.40 45	11 .48 16	2.0 .05 2	0 .00	164 2.69 91	4.3 .09 3	5.5 .16 5	.6 .01	.90	-- --	154 145	128 0	15E 0.4	
12/16/71 0945	5050 5050	6.33 1.0	11.1 86	40.1F 4.5C	7.4 7.8	287 294	--	--	12 .52 17	--	0 .00	164 2.69	--	7.6 .21	--	1.00	-- --		130	3E 0.5	
01/13/72 1010	5050 5050	0.24 .5	11.5 87	39.2F 4.0C	7.5 7.5	302 290	--	--	8.4 .37 13	--	0 .00	150 2.46	--	7.5 .21	--	.90	-- --		125	3E 0.3	
02/10/72 1015	5050 5050	0.29 1.0	11.4 89	41.0F 5.0C	7.4 7.3	262 264	--	--	12 .52 19	--	0 .00	123 2.02	--	7.4 .21	--	.60	-- --		108	60E 0.5	
03/09/72 1015	5050 5050	0.38 1.0	9.4 86	52.7F 11.5C	7.3	254	--	--	--	--	--	--	--	--	--	--	-- --			74	
04/17/72 1145	5350 5050	1.34 52	11.2 105	54.5F 12.5C	7.5 7.9	347 283	--	--	12 .52 17	--	0 .00	156 2.56	--	5.9 .17	--	.80	-- --		126	11A 0.5	
05/04/72 1205	5050 5050	2.79 275	9.0 97	67.1F 19.5C	7.8 7.2	274 275	--	--	12 .52 18	--	0 .00	147 2.41	--	7.0 .20	--	1.00	-- --		121	3A 0.5	
06/08/72 0845	5050 5050	3.23 375	7.7 89	73.4F 23.0C	7.6 7.3	306 281	--	--	11 .48 15	--	0 .00	144 2.36	--	5.4 .15	--	.90	-- --		122	8A 0.4	
07/14/72 1105	5050 5050	3.62 495	7.2 89	80.6F 27.0C	8.2	270	--	--	--	--	--	--	--	--	--	--	-- --			8A	
11/16/72 1200	5050 5050	0.34	9.5 84	50.0F 10.0C	7.6 7.4	234 246	--	--	11 .48 20	--	0 .00	128 2.10	--	6.0 .17	--	.80	-- --		98	90A 0.5	
12/07/72 1125	5050 5050	0.15	10.1 81	42.8F 6.0C	7.6	288	--	--	--	--	--	--	--	--	--	--	-- --				
01/19/73 1220	5050 5050	7.30	11.1 90	43.7F 6.5C	7.2 6.9	160 161	--	--	7.2 .31 19	--	0 .00	75 1.23 88	--	4.8 .14 10	1.4 .02 1	.40	-- --		66	300A 0.4	
02/08/73 1030	5050 5050	2700	11.2 92	44.6F 7.0C	7.4	265	--	--	--	--	--	--	--	--	--	--	-- --			29	
04/05/73 1030	5050 5050	148	9.8 91	53.6F 12.0C	8.0	286	--	--	--	--	--	--	--	--	--	--	-- --			15	
05/25/73 0840	5050 5050	480			7.4	269	--	--	--	--	--	--	--	--	--	--	-- --			14	
06/22/73 0855	5050 5050	530	7.8 92	75.2F 24.0C	8.0	262	--	--	--	--	--	--	--	--	--	--	-- --			24	
07/12/73 1135	5050 5050	570	7.6 93	78.8F 26.0C	7.9	276	--	--	--	--	--	--	--	--	--	--	-- --			10	
08/09/73 0810	5050 5050	465	8.0 98	78.8F 26.0C	8.2	260	--	--	--	--	--	--	--	--	--	--	-- --			10	
09/14/73 1145	5050 5050	133	9.6 107	71.6F 22.0C	7.7	270	--	--	--	--	--	--	--	--	--	--	-- --			2	

MINERAL ANALYSES OF SURFACE WATER

DATE TIME	SAMPLER LAB	G.H. Q DEPTH	DO SAT	TEMP	FIELD LABORATORY PH	EC	CA	MG	NA	K	CO3	HCO3	SO4	CL	NO3	B	F SIO2	TDS SUM	TH NCH	TURB SAR	REM
							MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE					MILLIGRAMS PER LITER					
A8 135.00 CACHE CREEK NEAR LOWER LAKE - OUTLET OF CLEAR LAKE													CONTINUED								
10/04/73 0910	5050 5050	1.94 115	10.6 109	62.6F 17.0C	7.6	288	--	--	--	--	--	--	--	--	--	--	-- --			6AF	
12/13/73 1050	5050 5050	3.70 530	12.3 106	48.2F 9.0C	7.4	242	--	--	--	--	--	--	--	--	--	--	-- --			20AF	
01/24/74 0940	5050 5050	6.75 3050	12.3 104	46.4F 8.0C	7.3	272	--	--	--	--	--	--	--	--	--	--	-- --			10AF	
02/07/74 1000	5050 5050	5.01 1220	12.7 106	45.5F 7.5C	7.1 7.4	276 272	22 1.10 38	15 1.23 43	11 .48 17	1.8 .05 2	0 .00	150 2.46 88	8.4 .17 6	5.2 .15 5	1.9 .03 1	1.00	-- --	149 140	119 0	7A 0.4	
04/04/74 0750	5050 5050	 3560	11.4 103	51.8F 11.0C	7.4 9.0	 240	--	--	9.2 .40 16	--	0 .00	132 2.16	--	6.1 .17	--	.80	-- --		107	10A 0.4	
05/16/74 1200	5050 5050	3.37 435	9.9 102	62.6F 17.0C	7.8	245	--	--	--	--	--	--	--	--	--	--	-- --			11AF	
06/13/74 0850	5050	 593	7.6 89	75.2F 24.0C	7.4	236	--	--	--	--	--	--	--	--	--	--	-- --			15AF	
07/11/74 1130	5050	 375	7.7 87	70.7F 21.5C	7.4	243	--	--	--	--	--	--	--	--	--	--	-- --			8AF	
08/08/74 0930	5050 5050	3.65 513		80.6F 27.0C	8.0 7.7	228 236	--	--	9.6 .42 17	--	0 .00	131 2.15	--	5.8 .16	--	.70	-- --		104	4A 0.4	
09/06/74 1205	5050	 275	7.8 94	77.0F 25.0C	7.6	249	--	--	--	--	--	--	--	--	--	--	-- --			5AF	

TRACE METALS ANALYSES mg/l

Date	Aluminum	Beryllium	Bismuth	Cadmium	Chromium	Cobalt	Copper	Gallium	Germanium	Iron	Lead	Manganese	Molybdenum	Nickel	Titanium	Vanadium	Zinc
Clear Lake Station 1 - Upper Arm																	
4-20-65	.039	.001*	.001*	.003*	.003*	.003*	.009	.013*	.001*	.073	.003*	.003	.001*	.002	.001	.002	.013*
5-20-65	.072	.001*	.001*	.003*	.003*	.003*	.007'	.013*	.001*	.057	.003*	.003	.001*	.002	.004	.002	.013*
Clear Lake Station 3 - Lower Arm																	
4-20-65	.033	.001*	.001*	.003*	.003*	.003*	.013	.013*	.001*	.073	.003*	.003	.001*	.002	.001	.002	.013*
5-20-65	.067	.001*	.001*	.003*	.003*	.003*	.016	.013*	.001*	.090	.003*	.003	.001*	.001	.002	.003	.013*
Clear Lake Station 4 - Oaks Arm																	
4-20-65	.033	.001*	.001*	.003*	.003*	.003*	.014	.013*	.001*	.067	.003*	.006	.001*	.002	.001	.002	.013*
5-20-65	.073	.001*	.001*	.003*	.003*	.003*	.012	.013*	.001*	.100	.003*	.003	.001*	.002	.004	.002	.013*

* Less than the amount indicated.

HEAVY METAL ANALYSES (mg/l)

Date & Time	Disch. EC	Temp. pH	Arsenic	Barium Cadmium	Chrom (All) Chrom (Hex)	Copper Iron	Lead Manganese	Mercury Selenium	Silver Zinc
Clear Lake at Lakeport									
4/4/74	-	11.0C		-	-	0.00	0.00	-	-
0650		7.5	-	0.01	-	1.3	0.04	-	0.00
Cache Creek near Lower Lake - Outlet from Clear Lake									
5-4-72	275	19.5C		-	-	0.02	0.03	-	-
1205	274	7.8	-	0.00	-	1.0	0.04	-	0.02
4-4-74	-	11.0C		-	-	0.00	0.00	-	-
0750	-	7.4	-	0.01	-	1.4	0.03	-	0.00

APPENDIX B

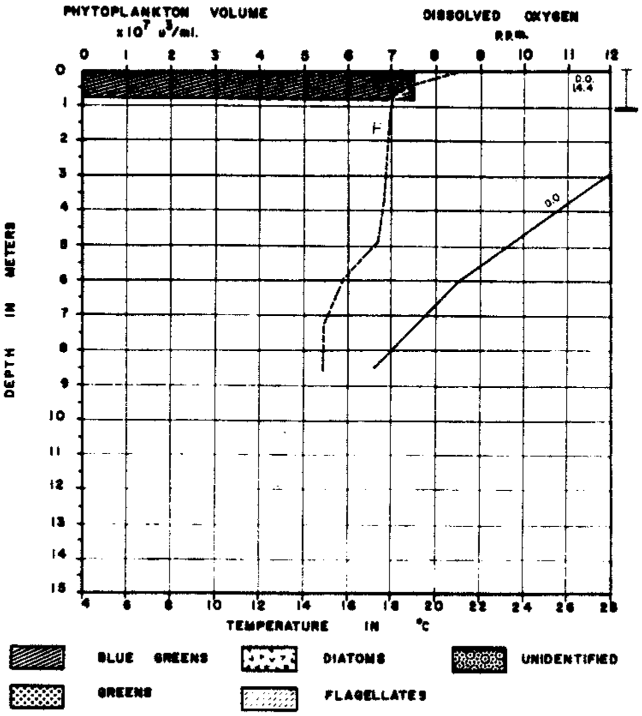
LIMNOLOGICAL SURVEY DATA
1968-1973

CLEAR LAKE STA. 1

DATE 5-2-68

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.56	0.9	0.06	0.03	
BOTT.						



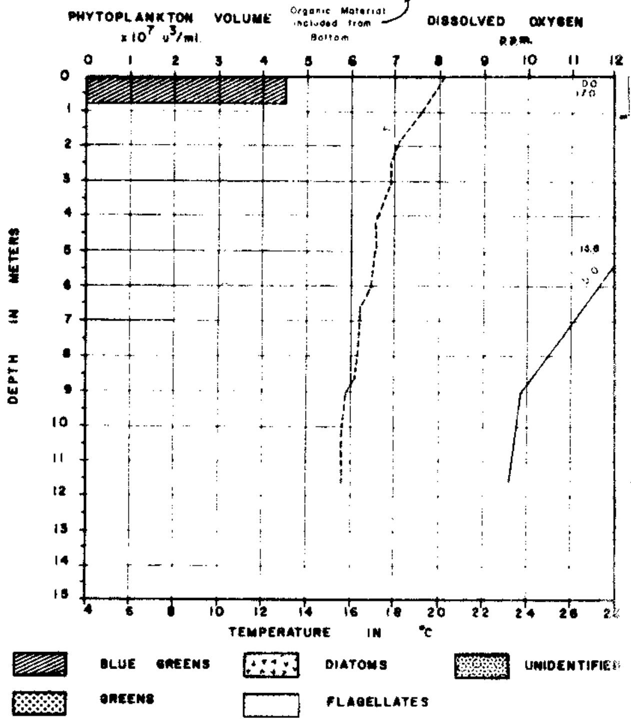
CLEAR LAKE STA. 3

DATE 5-2-68

AVG. u^3/ml ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.27	0.9	0.04	0.03	
BOTT.	0.10	.27	70	1.2	0.06	

Organic Material included from Bottom

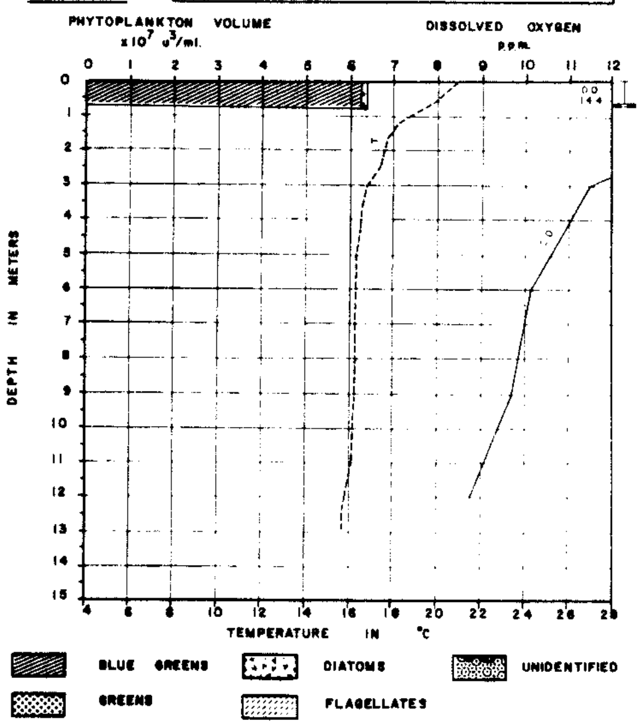


CLEAR LAKE STA. 4

DATE 5-2-68

AVG. u^3/ml ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.09	0.56	1.0	0.06	0.04	
BOTT.						

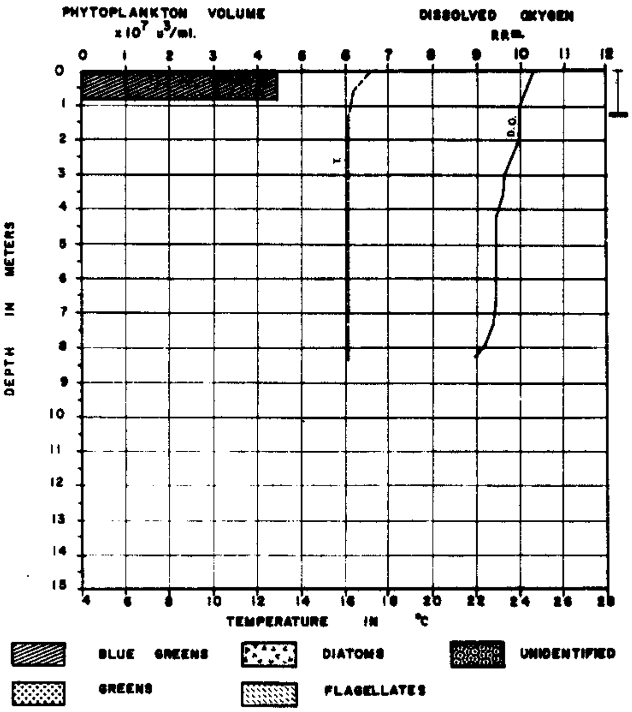


CLEAR LAKE STA. 1

DATE 5-15-68

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.18	0.9	0.07	0.00	
BOTT.						

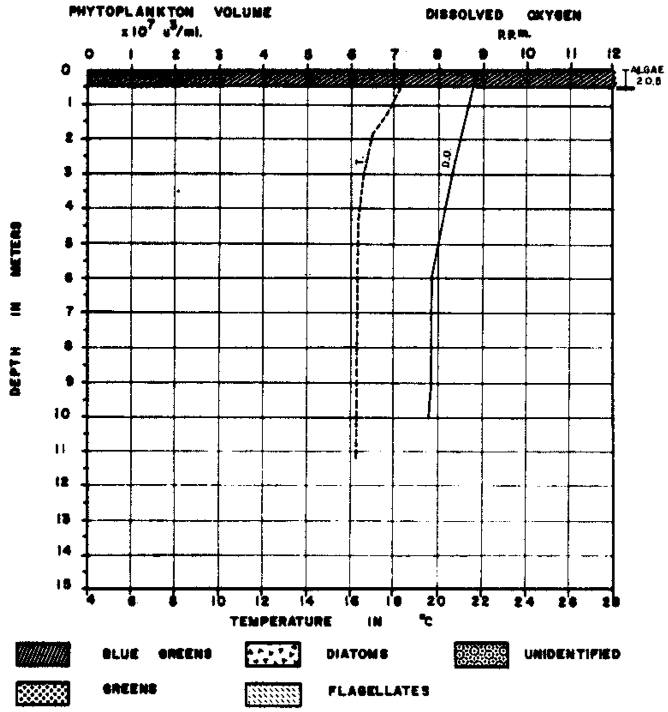


CLEAR LAKE STA. 3

DATE 5-15-68

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.12	1.1	3.1	0.00	0.27	
BOTT.						

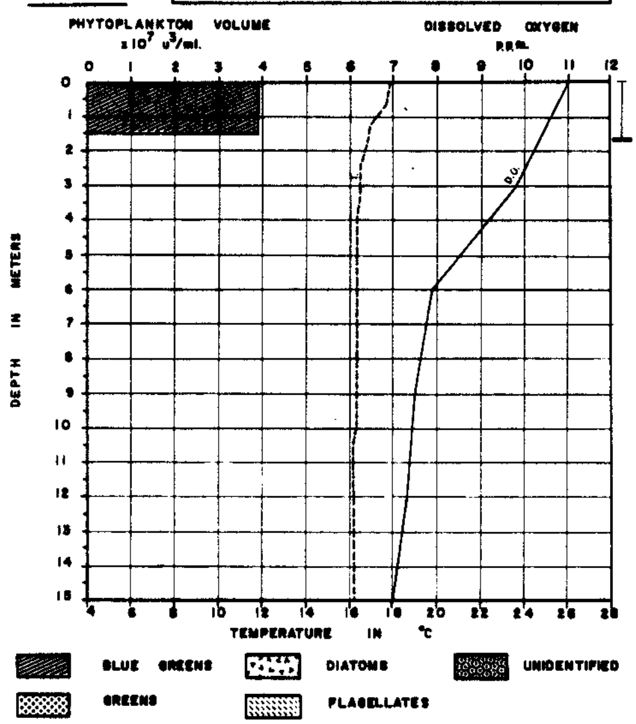


CLEAR LAKE STA. 4

DATE 5-15-68

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.09	0.32	1.2	0.06	0.01	
BOTT.						

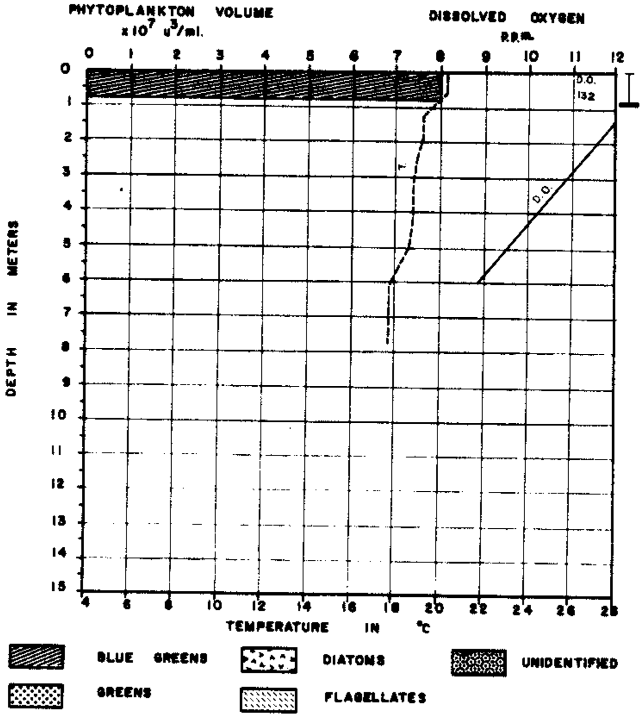


CLEAR LAKE STA. 1

DATE 5-29-68

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.27	1.2	0.05	0.03	
BOTT.	0.03	0.20	0.8	0.08	0.07	

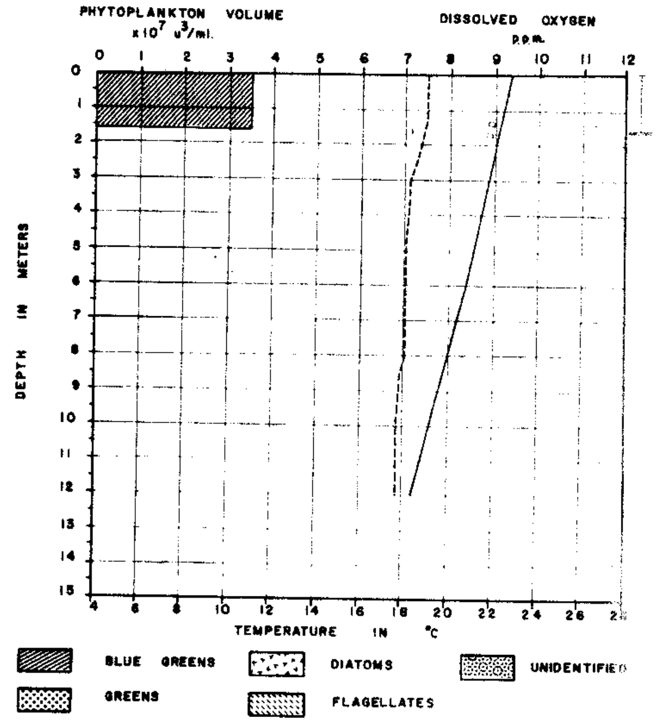


CLEAR LAKE STA. 3

DATE 5-29-68

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.07	0.26	1.1	0.07	0.02	
BOTT.						

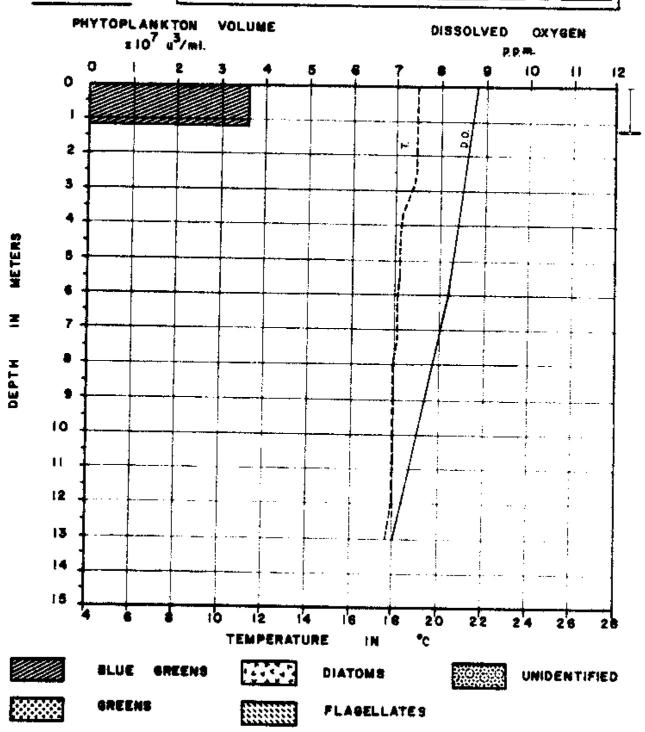


CLEAR LAKE STA. 4

DATE 5-29-68

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.10	0.38	1.1	0.23	0.04	
BOTT.	0.09	3.5	4.0	0.22	0.24	

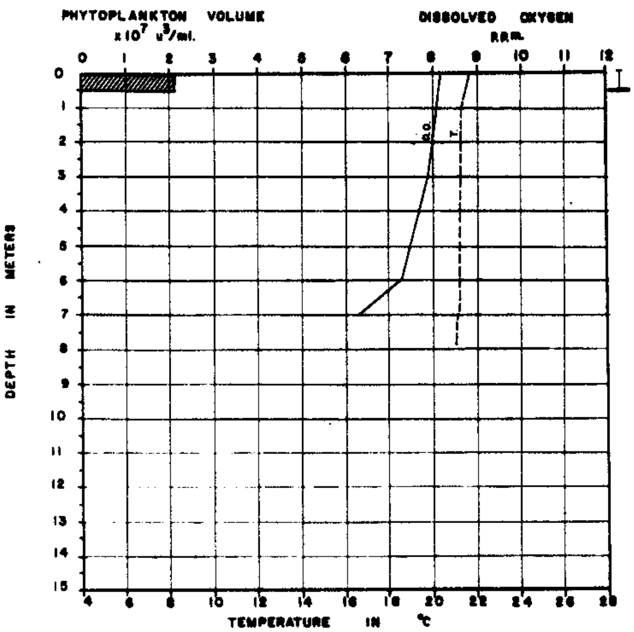


CLEAR LAKE STA. 1

DATE 6-12-68

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.32	0.9	0.13	0.07	
BOTT.						



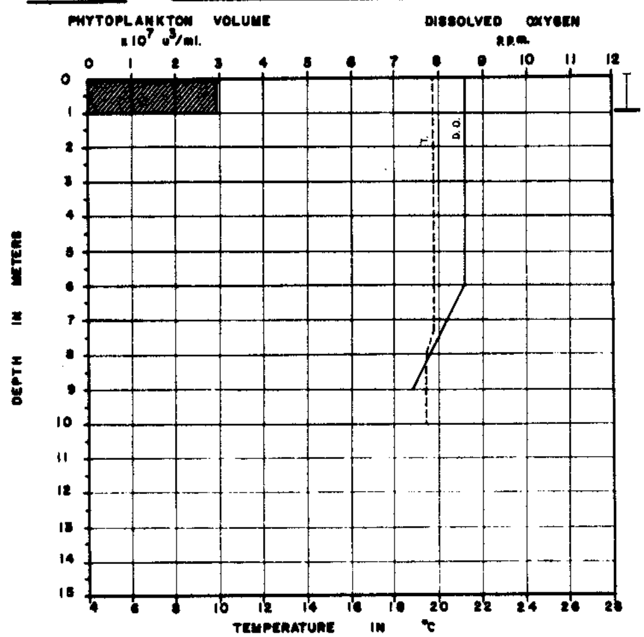
BLUE GREENS — DIATOMS — UNIDENTIFIED — GREENS — FLAGELLATES

CLEAR LAKE STA. 3

DATE 6-12-68

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.36	1.1	0.08	0.02	
BOTT.						



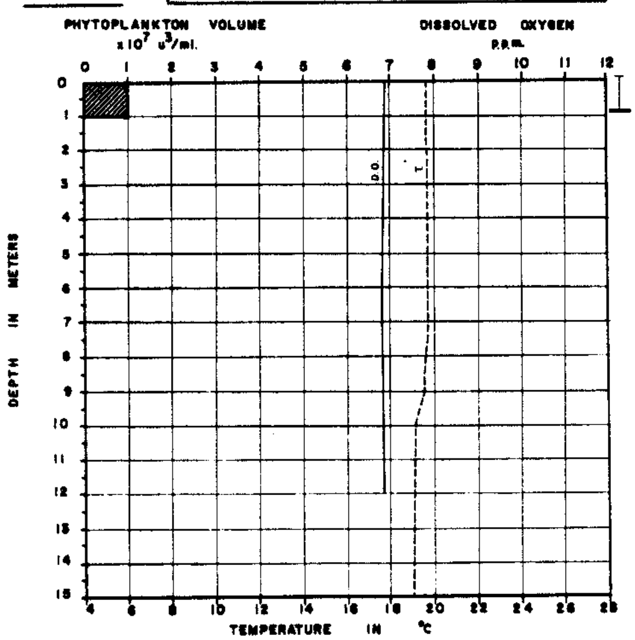
BLUE GREENS — DIATOMS — UNIDENTIFIED — GREENS — FLAGELLATES

CLEAR LAKE STA. 4

DATE 6-12-68

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.22	0.39	0.8	0.38	0.06	
BOTT.						



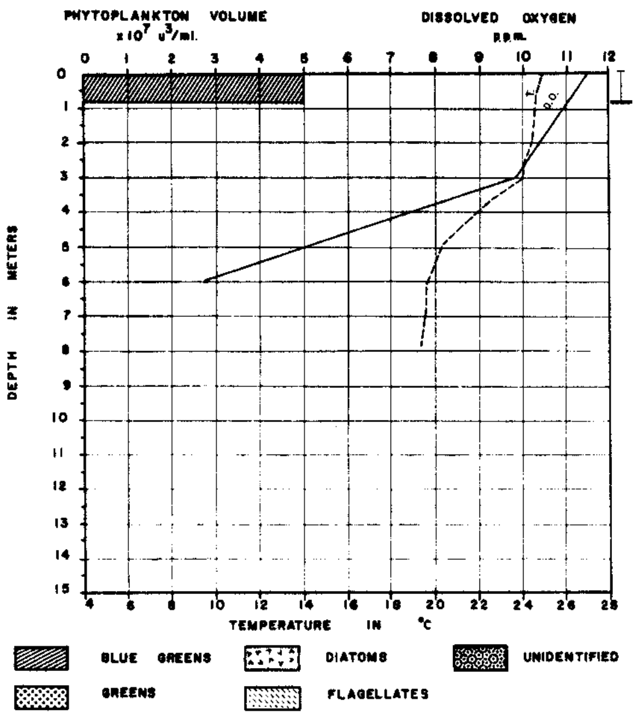
BLUE GREENS — DIATOMS — UNIDENTIFIED — GREENS — FLAGELLATES

CLEAR LAKE STA. 1

DATE 6-26-68

AVG. u^3/ml.

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.34	0.8	0.06	0.05	
BOTT.						

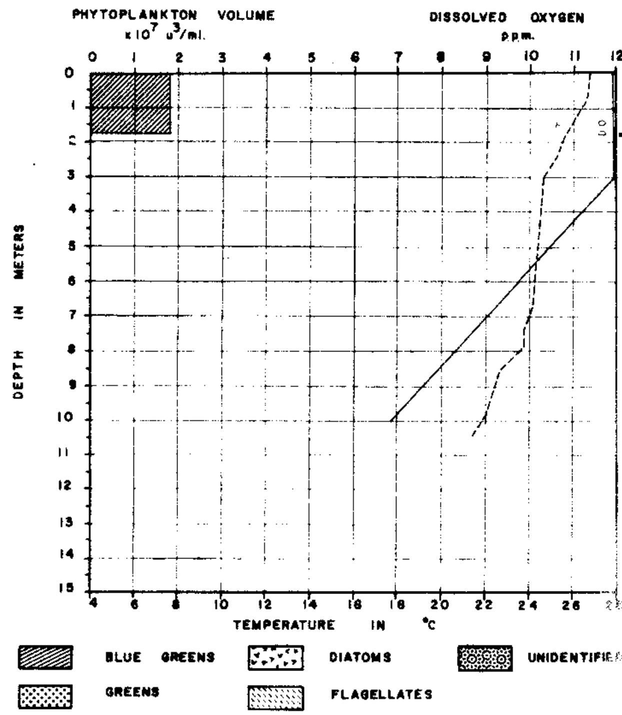


CLEAR LAKE STA. 3

DATE 6-26-68

AVG. u^3/ml

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.20	0.6	0.02	0.03	
BOTT.						

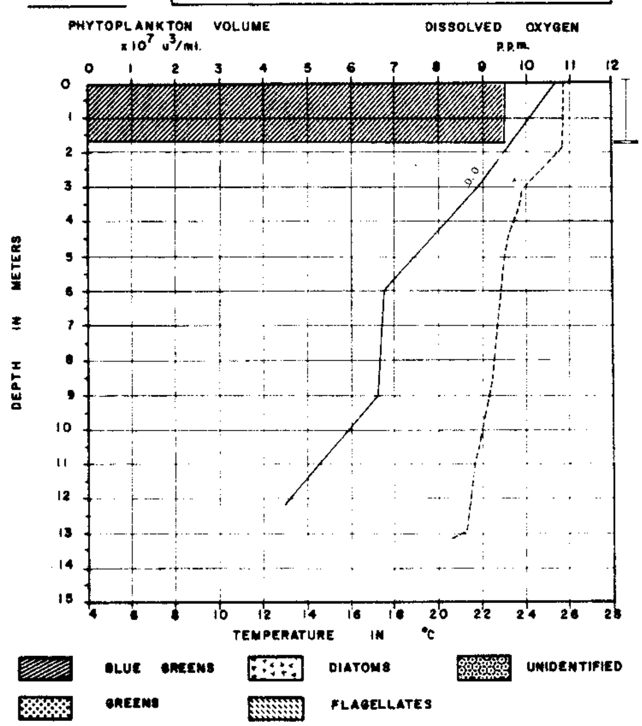


CLEAR LAKE STA. 4

DATE 6-26-68

AVG. u^3/ml.

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.42	1.4	0.04	0.03	
BOTT.						

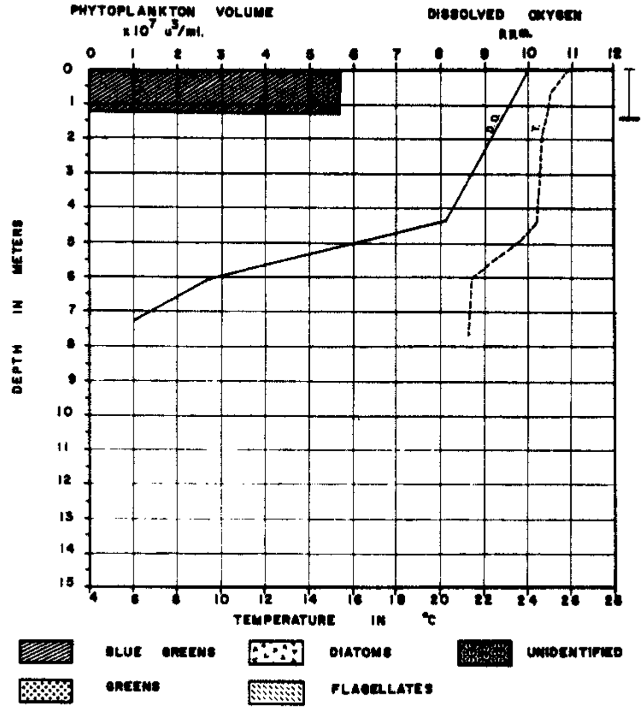


CLEAR LAKE STA. I

DATE 7-10-68

AVG. u³/ml.

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.30	1.2	0.14	0.04	
BOTT.						

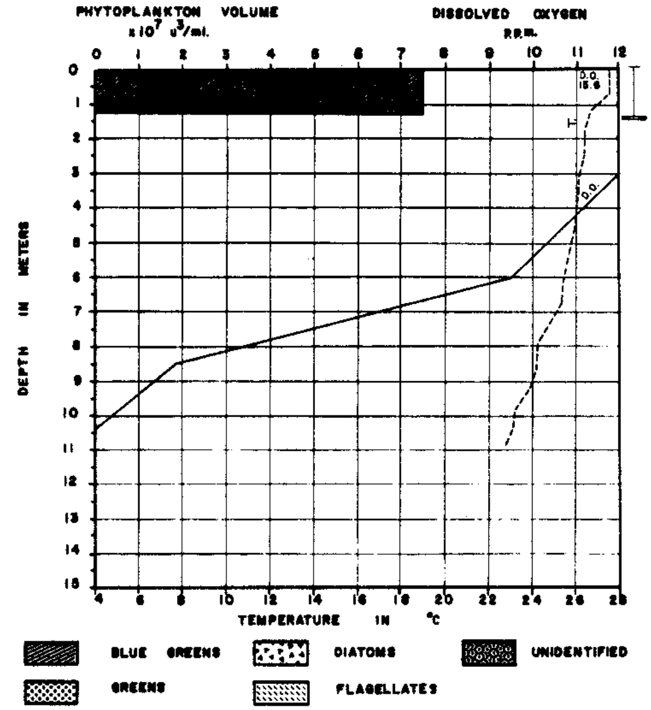


CLEAR LAKE STA. 3

DATE 7-10-68

AVG. u³/ml.

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.37	1.9	0.09	0.02	
BOTT.	0.63	1.6	0.4	0.78	0.03	

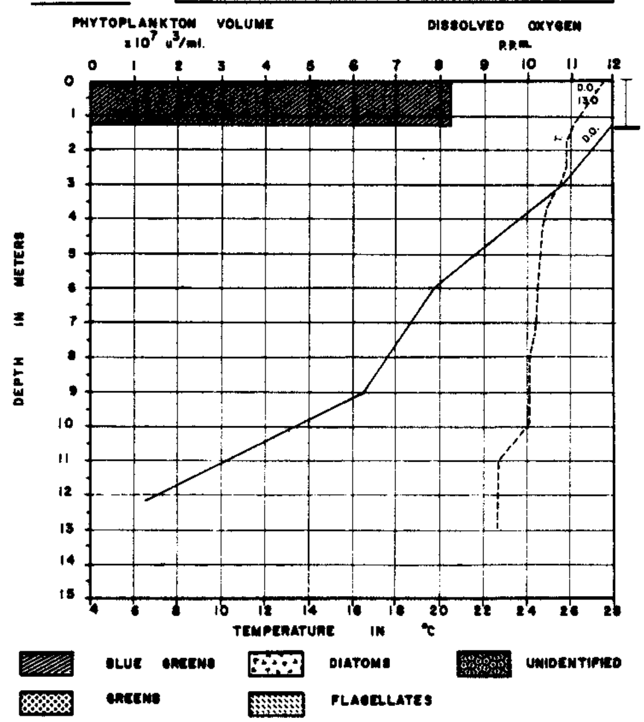


CLEAR LAKE STA. 4

DATE 7-10-68

AVG. u³/ml.

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.08	0.08	2.0	0.08	0.02	
BOTT.						

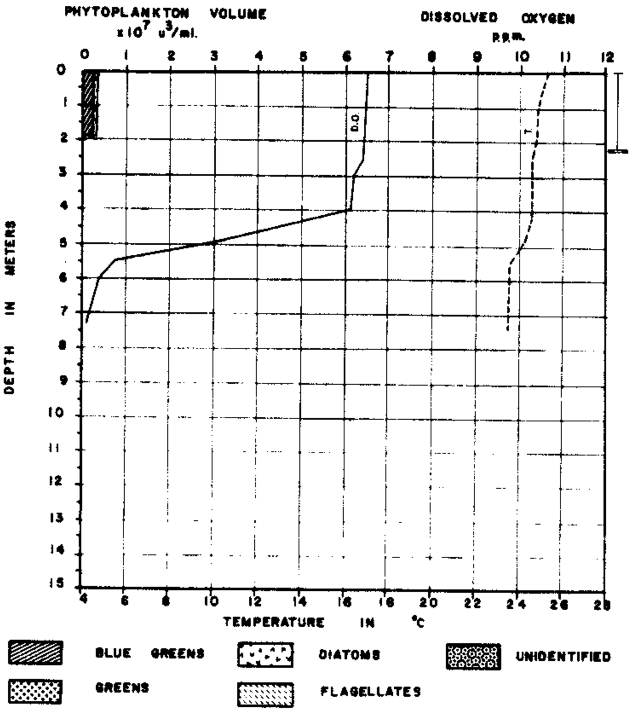


CLEAR LAKE STA. 1

DATE 7-24-68

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.19	0.33	0.6	0.03	0.02	
BOTT.						

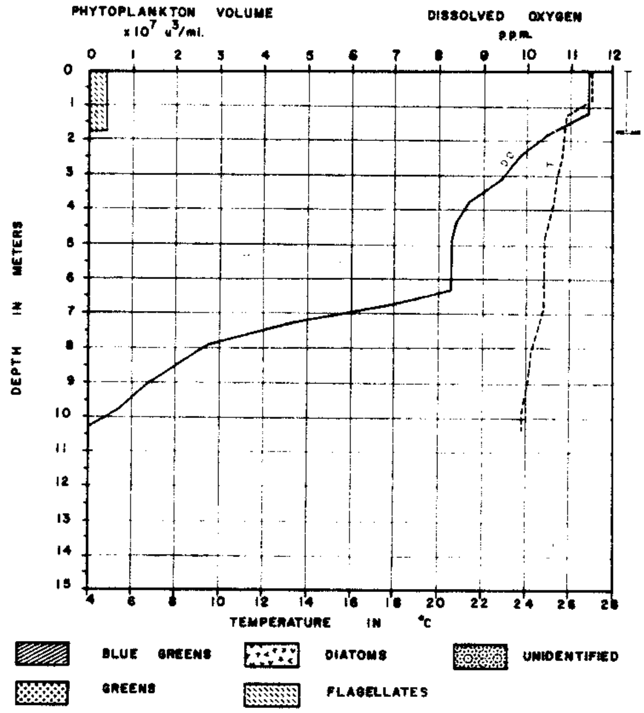


CLEAR LAKE STA. 3

DATE 7-24-68

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.16	0.37	0.9	0.19	0.03	
BOTT.						

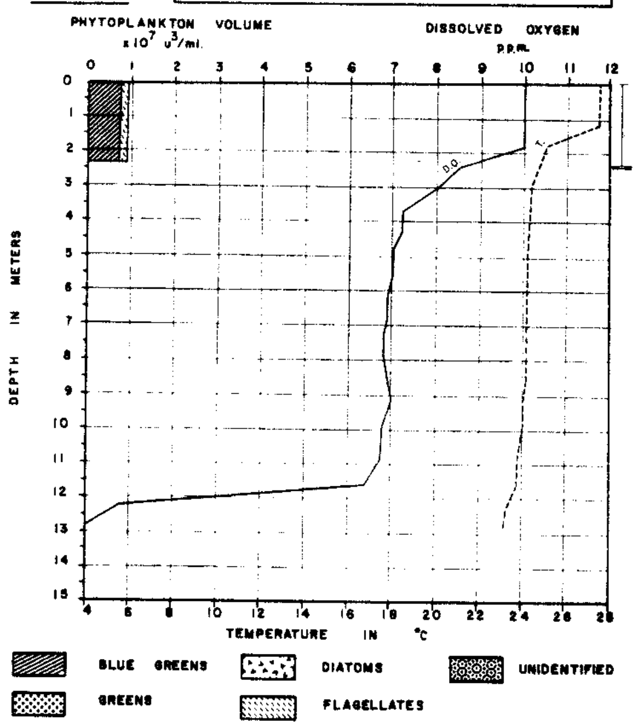


CLEAR LAKE STA. 4

DATE 7-24-68

AVG u^3/ml ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.19	0.48	0.8	0.08	0.01	
BOTT.						

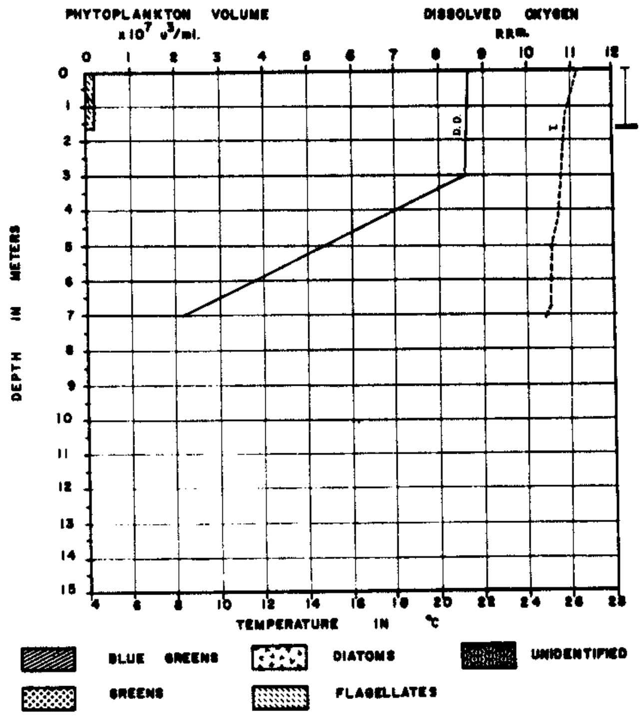


CLEAR LAKE STA. 1

DATE 8-7-68

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.33	0.80	0.6	0.02	0.02	—
BOTT.	0.65	0.80	0.6	0.22	0.05	—

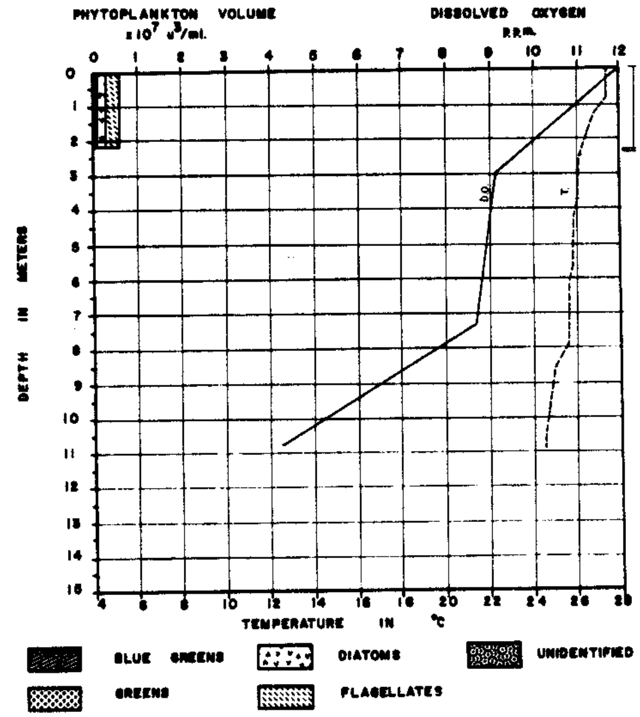


CLEAR LAKE STA. 3

DATE 8-7-68

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.09	0.30	0.9	0.03	0.02	—
BOTT.	0.24	0.86	0.7	0.42	0.04	—

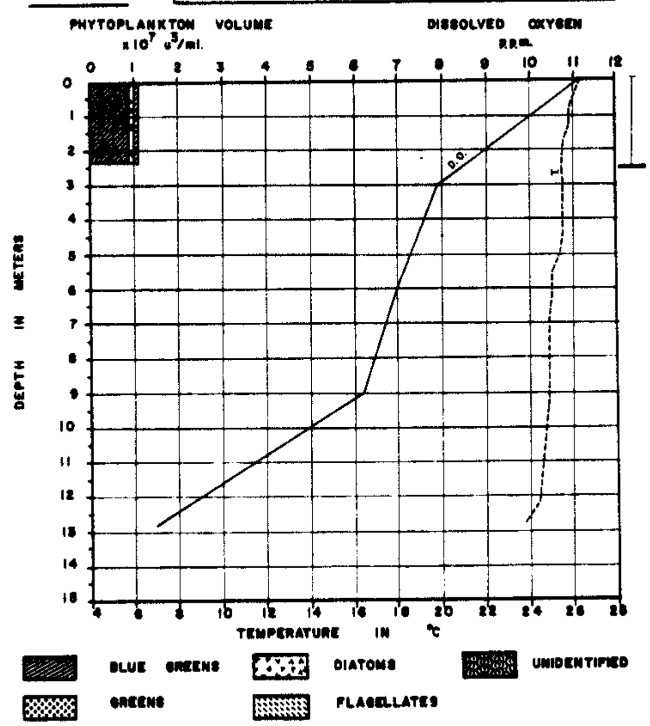


CLEAR LAKE STA. 4

DATE 8-7-68

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	—	—	—	—	—	—
BOTT.	—	—	—	—	—	—

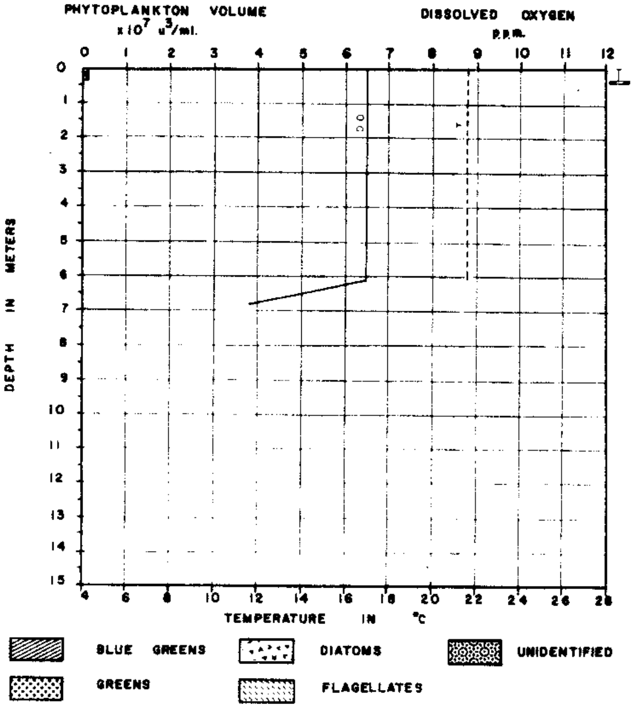


CLEAR LAKE STA. I

DATE 8-21-68

AVG. u³/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.55	0.69	0.6	0.15	0.13	
BOTT.	0.49	0.87	0.6	0.14	0.10	

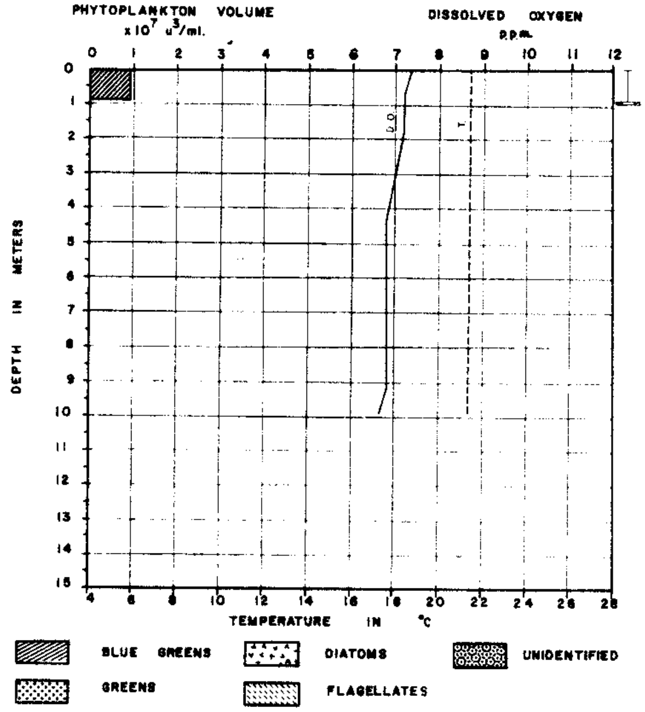


CLEAR LAKE STA. 3

DATE 8-21-68

AVG. u³/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.19	0.61	1.0	0.26	0.02	
BOTT.	0.23	0.59	0.9	0.20	0.05	

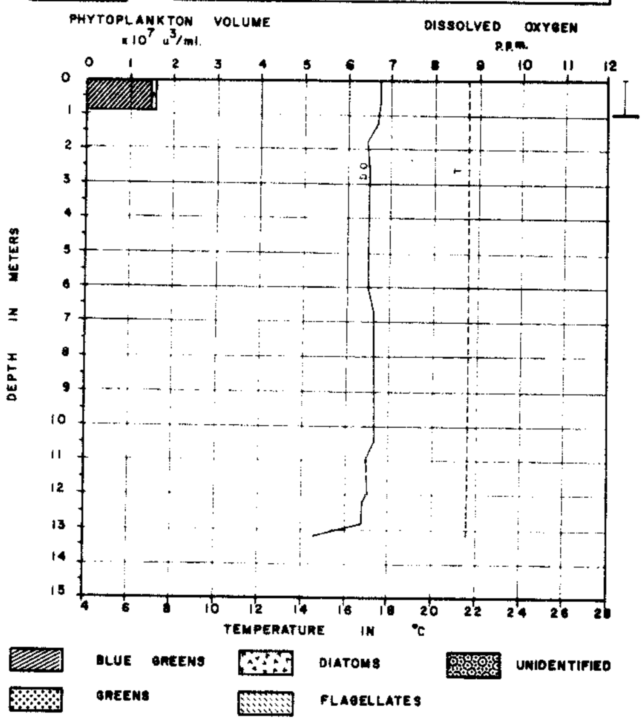


CLEAR LAKE STA. 4

DATE 8-21-68

AVG u³/ml ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF	0.39	0.64	1.0	0.23	0.02	
BOTT	0.49	0.68	0.70	0.18	0.03	

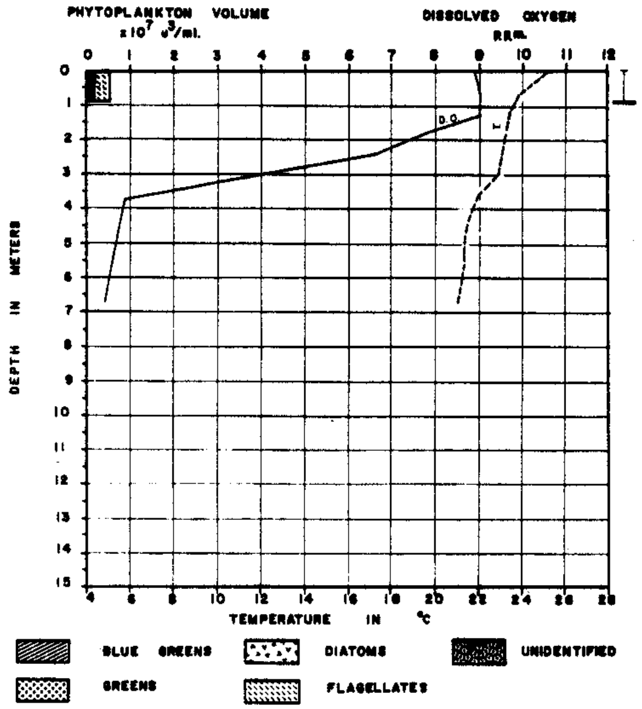


CLEAR LAKE STA. 1

DATE 9-4-68

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.36	0.49	0.7	0.03	0.04	
BOTT.	0.38	0.72	0.7	0.03	0.30	

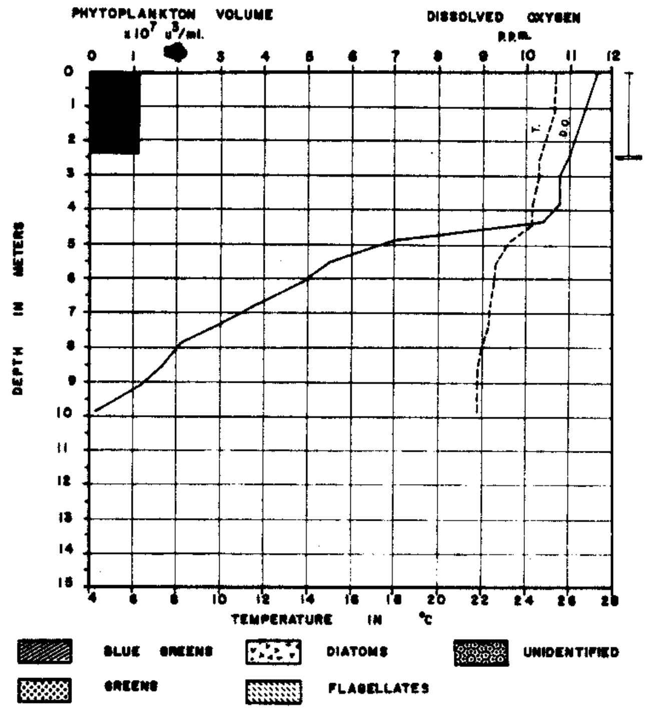


CLEAR LAKE STA. 3

DATE 9-4-68

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.11	0.36	0.9	0.03	0.01	
BOTT.	0.34	0.69	0.6	0.07	0.17	

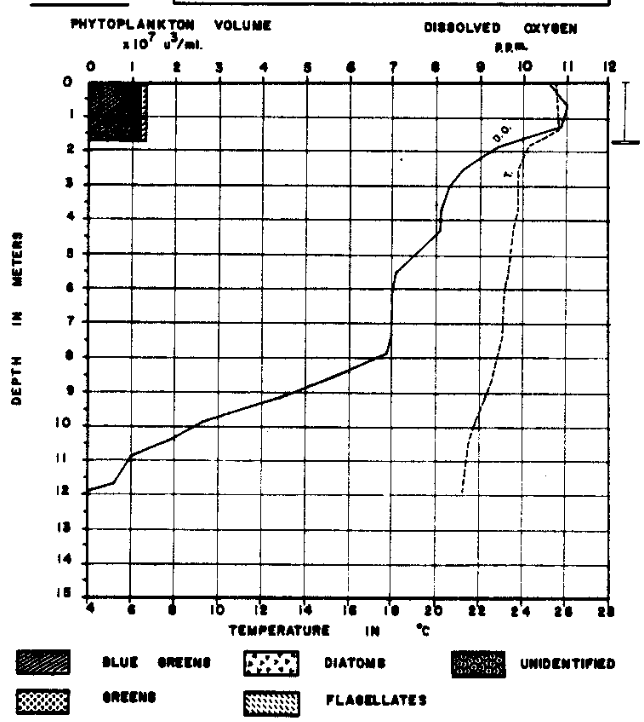


CLEAR LAKE STA. 4

DATE 9-4-68

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.29	0.62	0.8	0.03	0.03	
BOTT.	0.38	0.65	0.8	0.06	0.36	



CLEAR LAKE STA. 1

Date - 9-18-68

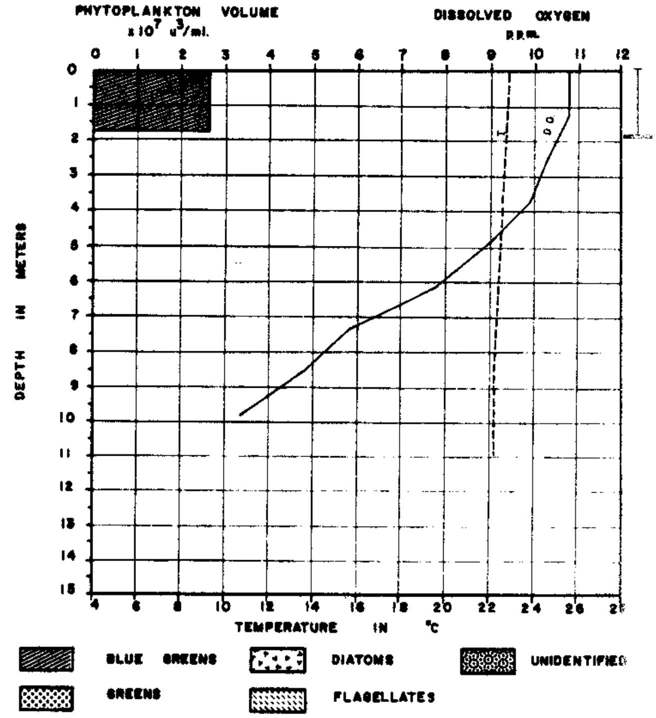
Data not available

CLEAR LAKE STA. 3

DATE 9-18-68

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.12	0.41	1.4	0.06	0.03	
BOTT.	0.21	0.71	1.2	0.14	0.06	

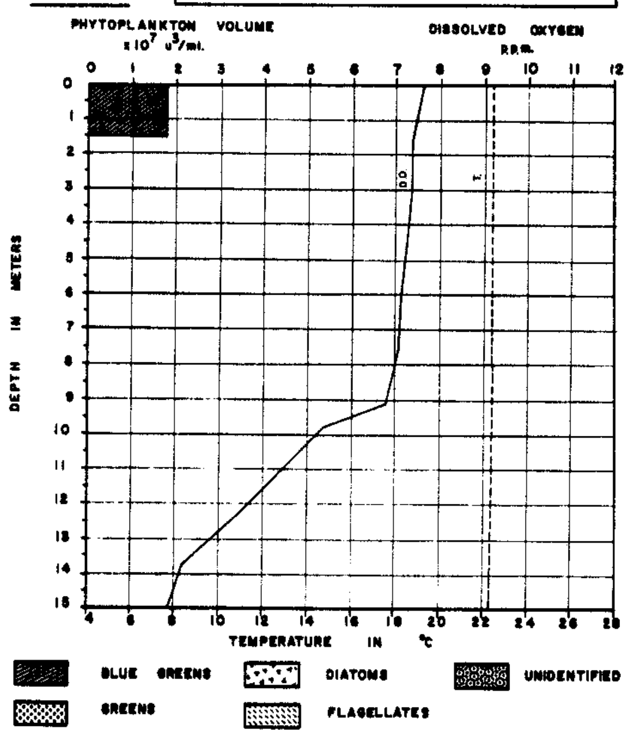


CLEAR LAKE STA.4

DATE 9-18-68

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.33	0.54	0.7	0.10	0.08	
BOTT.	0.34	0.89	0.9	0.28	0.12	

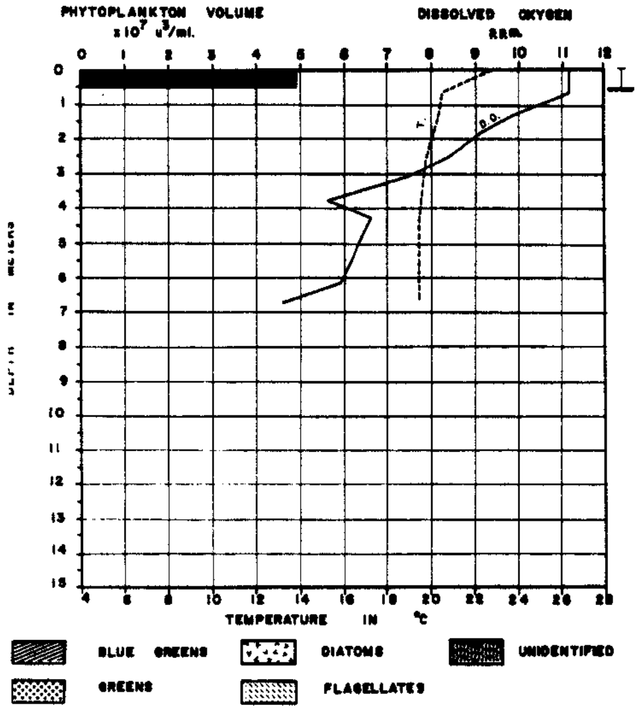


CLEAR LAKE STA. 1

DATE 9-26-68

AVG. u^3/ml. ——

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	—	—	—	—	—	
BOTT.	—	—	—	—	—	

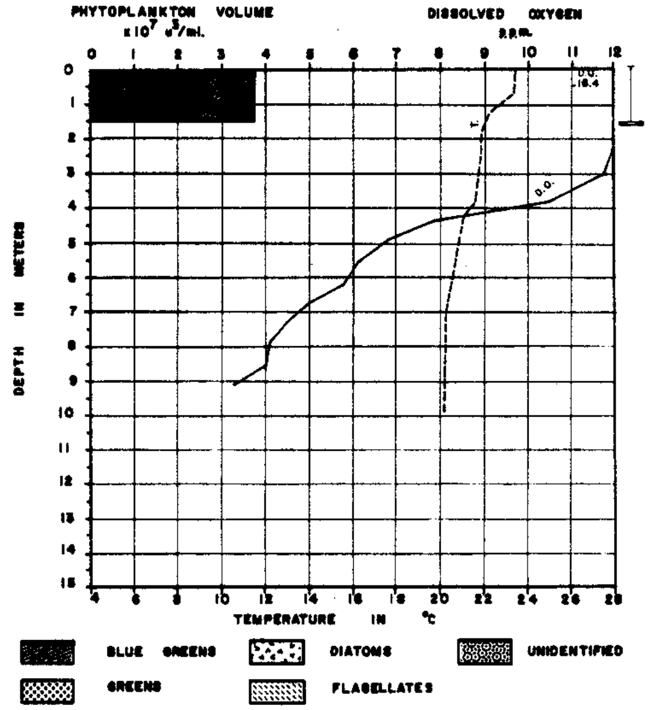


CLEAR LAKE STA. 3

DATE 9-26-68

AVG. u^3/ml. ——

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	—	—	—	—	—	
BOTT.	—	—	—	—	—	

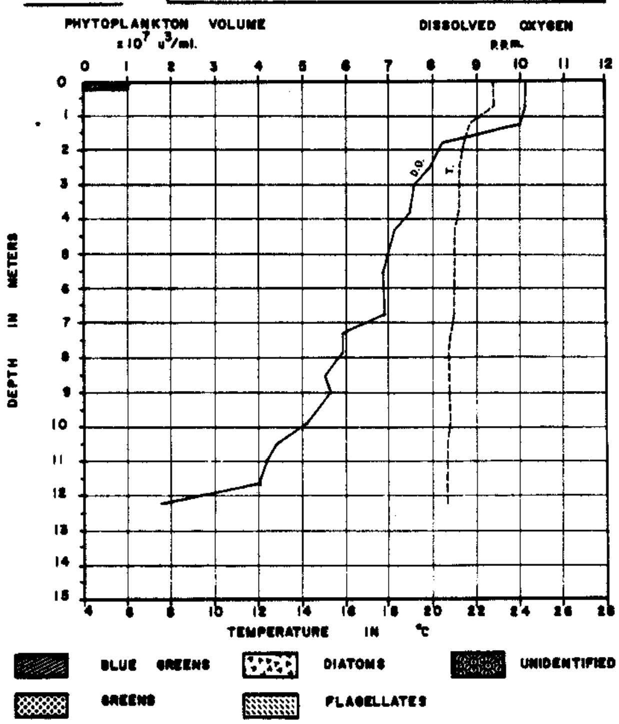


CLEAR LAKE STA. 4

DATE 9-26-68

AVG. u^3/ml. ——

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	—	—	—	—	—	
BOTT.	—	—	—	—	—	

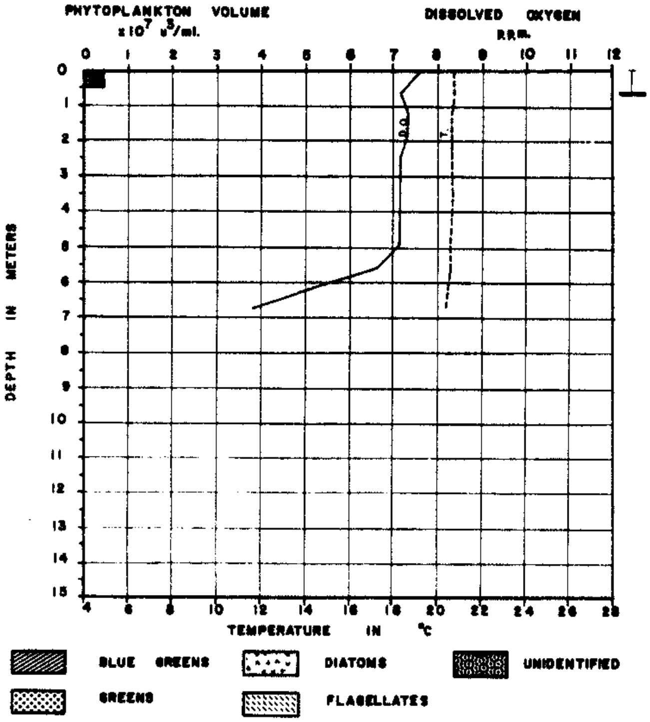


CLEAR LAKE STA. I

DATE 10-3-68

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.84	0.71	0.6	0.03	0.17	____
BOTT.	0.69	0.77	0.5	0.04	0.22	____

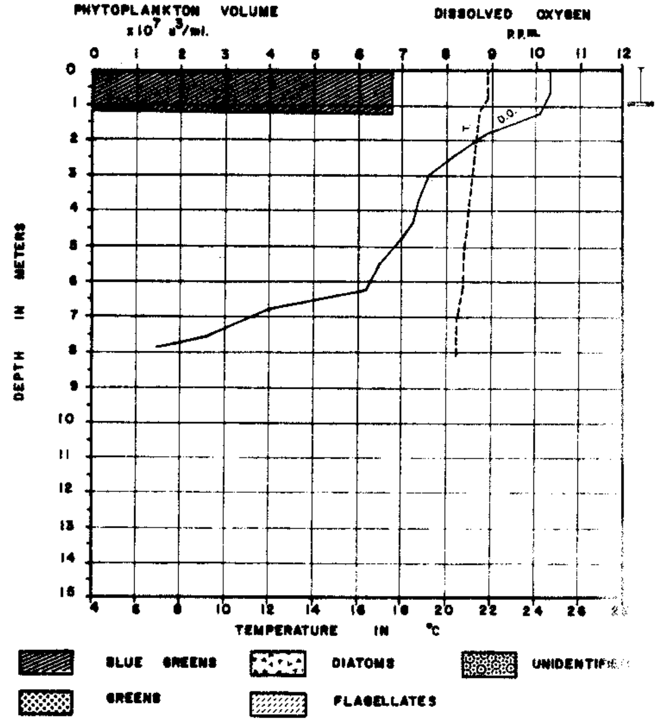


CLEAR LAKE STA. 3

DATE 10-3-68

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.21	0.59	1.8	0.04	0.06	____
BOTT.	0.23	0.39	0.8	0.25	0.09	____

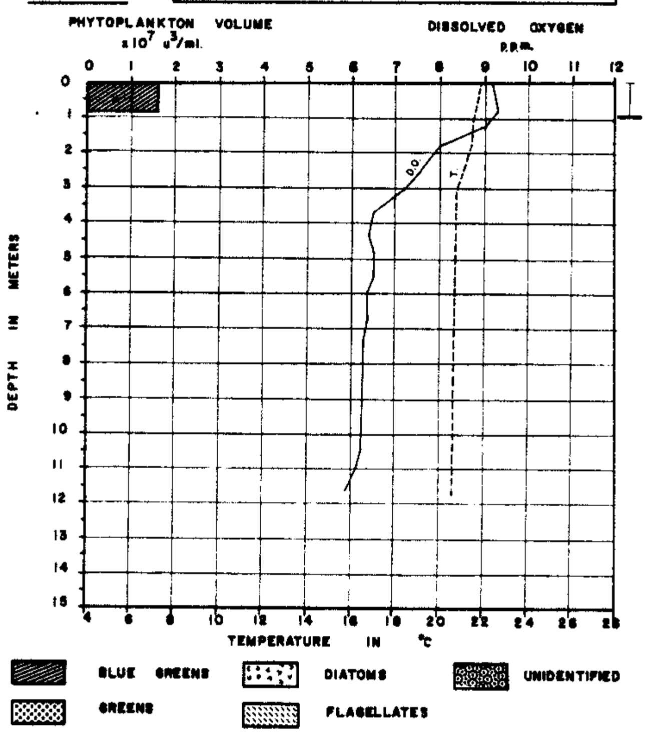


CLEAR LAKE STA. 4

DATE 10-3-68

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.35	0.67	1.2	0.01	0.18	____
BOTT.	0.41	0.55	0.6	0.05	0.27	____

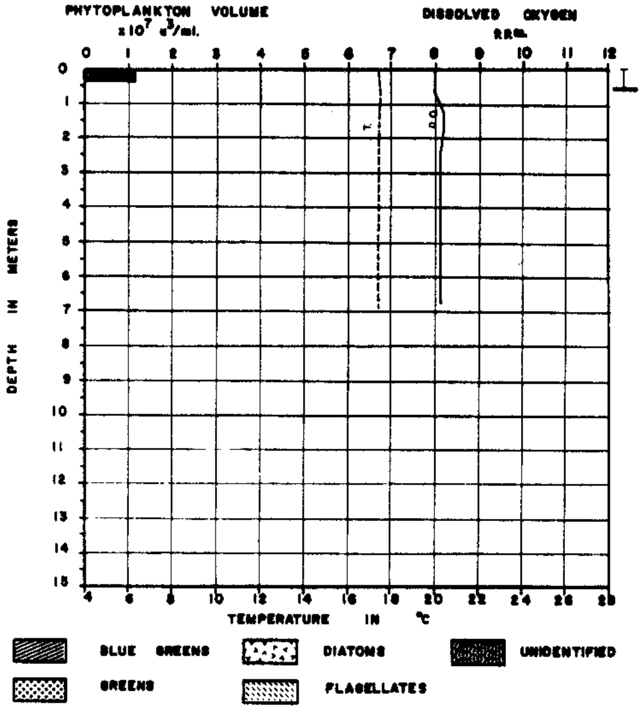


CLEAR LAKE STA. 1

DATE 10-17-66

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.68	0.78	0.6	0.06	0.32	
BOTT.	0.64	0.78	0.6	0.05	0.34	

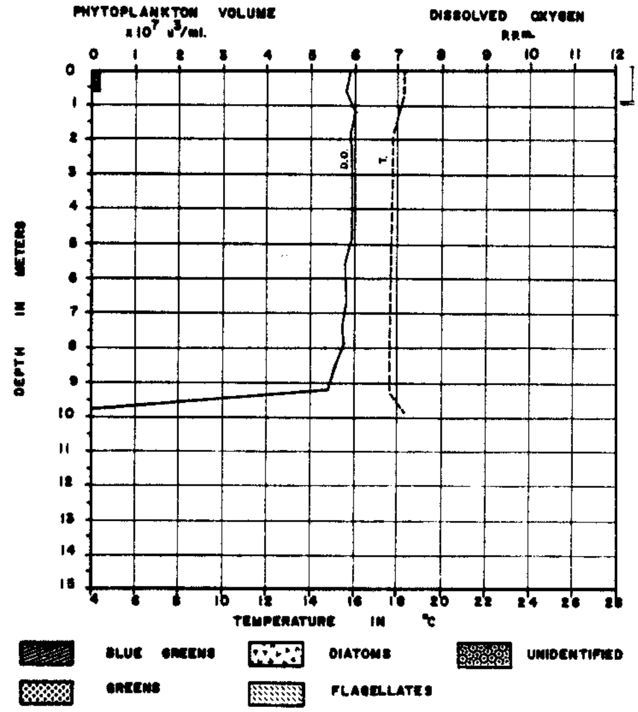


CLEAR LAKE STA. 3

DATE 10-17-66

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.26	0.42	0.7	0.31	0.13	
BOTT.	0.22	0.34	0.7	0.42	0.13	

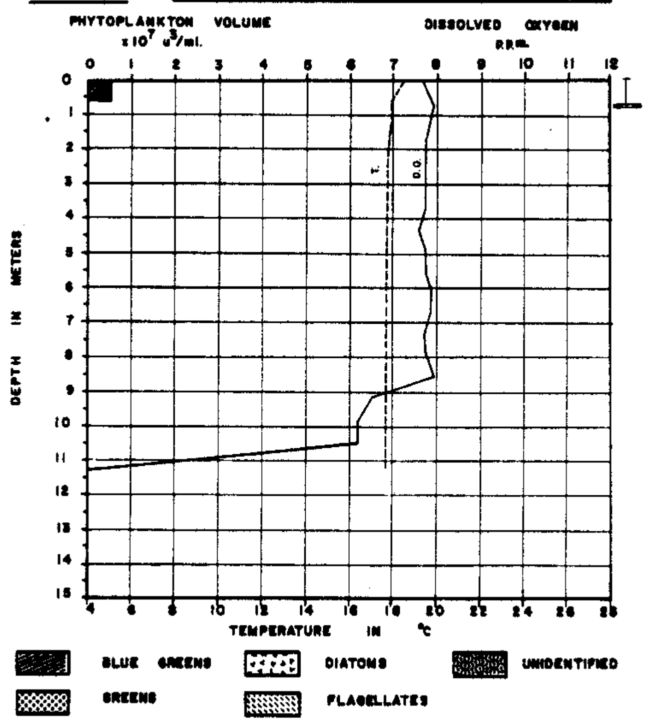


CLEAR LAKE STA. 4

DATE 10-17-66

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.36	0.82	0.7	0.04	0.32	
BOTT.	0.41	0.83	0.7	0.06	0.32	

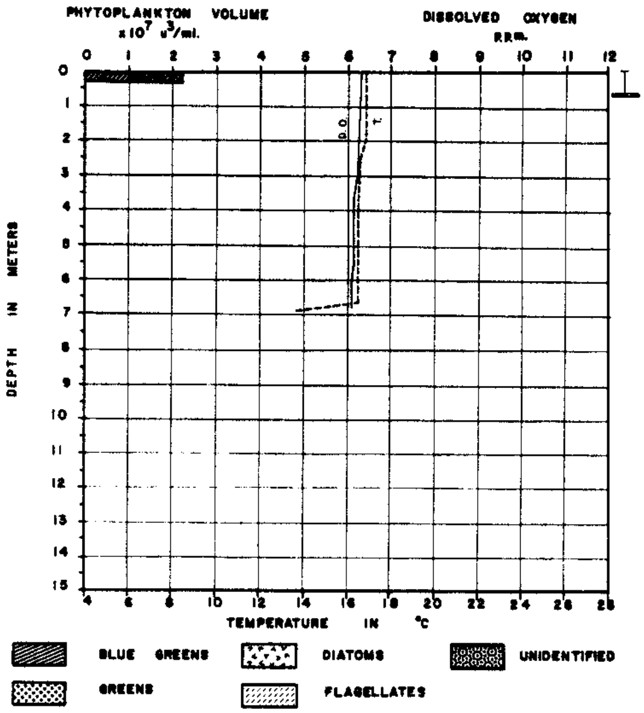


CLEAR LAKE STA. 1

DATE 10-30-68

AVG. u^3/ml. ——

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.58	0.74	0.6	0.05	0.28	
BOTT.	0.64	0.79	0.7	0.07	0.28	

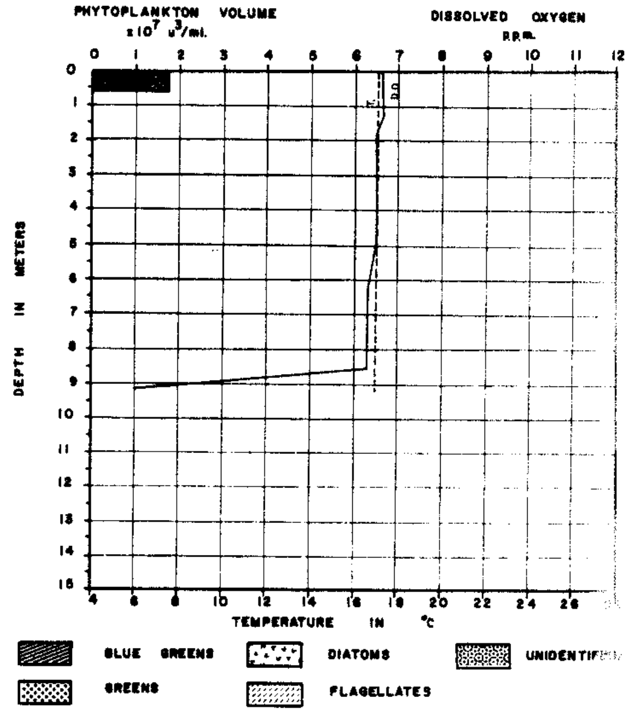


CLEAR LAKE STA. 3

DATE 10-30-68

AVG. u^3/ml. ——

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.22	0.39	1.1	0.25	0.21	
BOTT.	0.16	0.65	1.7	0.27	0.22	

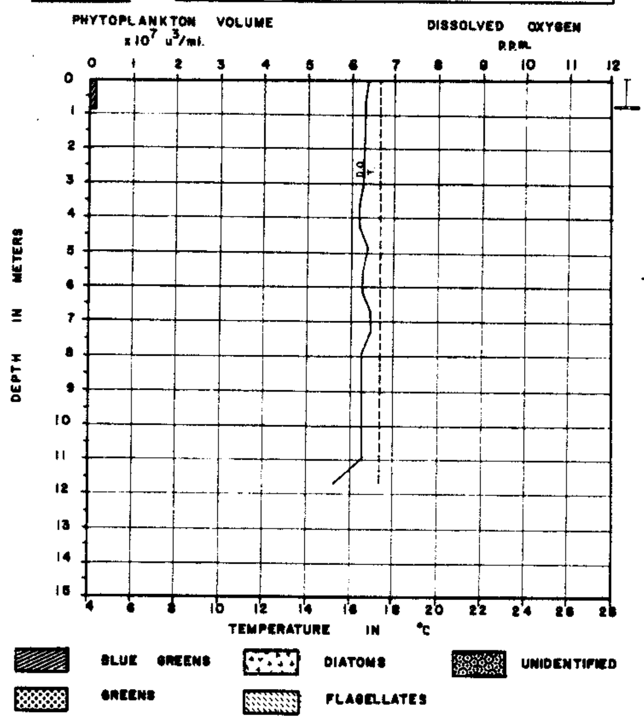


CLEAR LAKE STA. 4

DATE 10-30-68

AVG. u^3/ml. ——

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.36	0.62	0.8	0.04	0.34	
BOTT.	0.37	0.66	0.9	0.04	0.9	

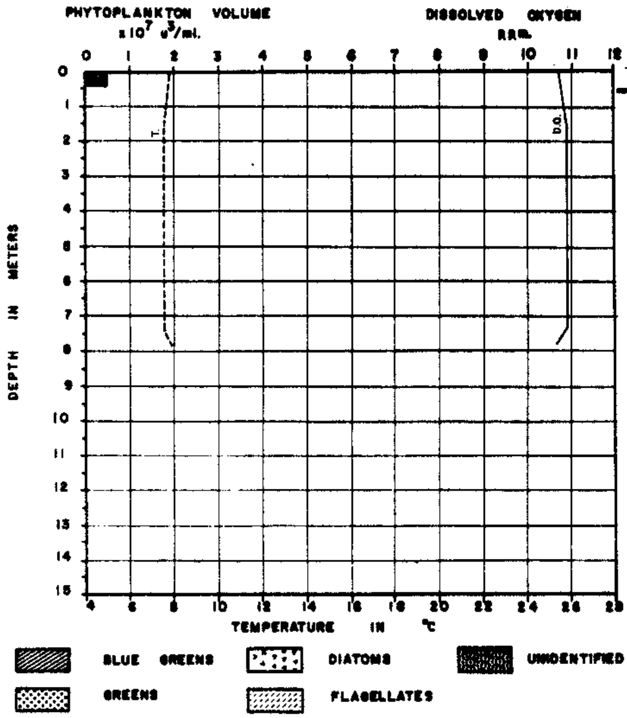


CLEAR LAKE STA. I

DATE 12-20-68

AVG. u³/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.33	0.63	0.4	0.01	0.24	
BOTT.	0.34	0.44	0.5	0.00	0.30	

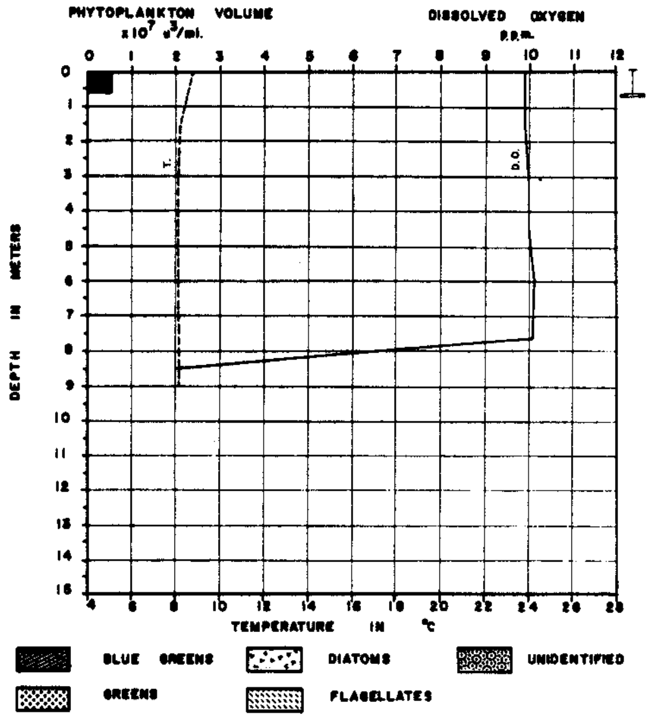


CLEAR LAKE STA. 3

DATE 12-20-68

AVG. u³/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.14	0.48	0.5	0.07	0.46	
BOTT.	0.14	0.38	0.4	0.11	0.48	

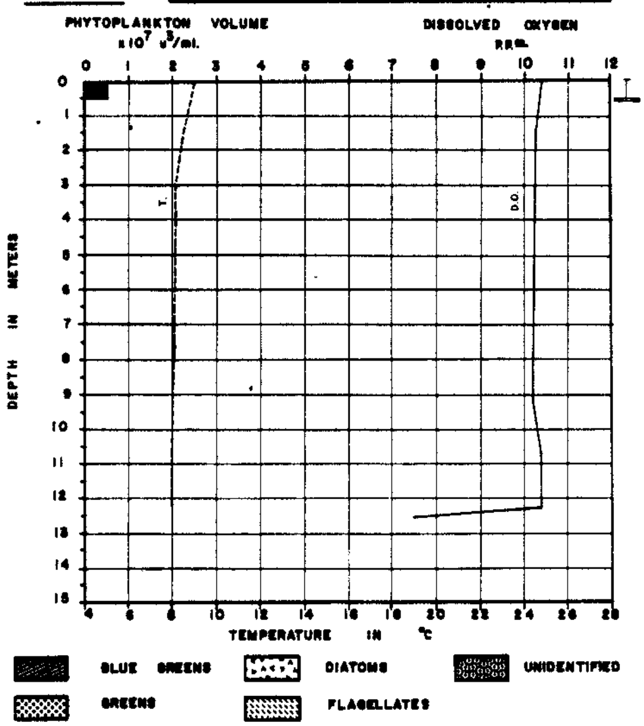


CLEAR LAKE STA. 4

DATE 12-20-68

AVG. u³/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.28	0.49	0.4	0.00	0.42	
BOTT.						

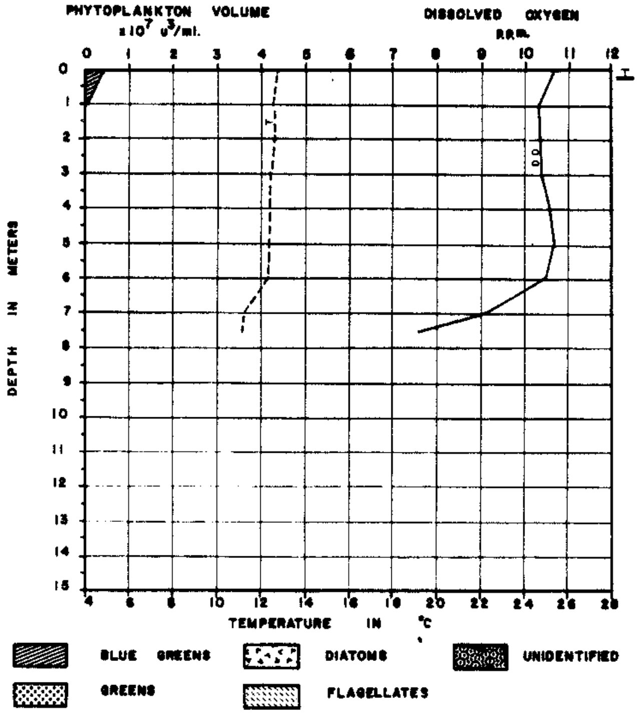


CLEAR LAKE STA. 1

DATE 2-13-69

AVG. u^3/ml. ——

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	.07	.17	0.4	0.00	0.37	
BOTT.	.06	.12	0.4	0.03	0.34	

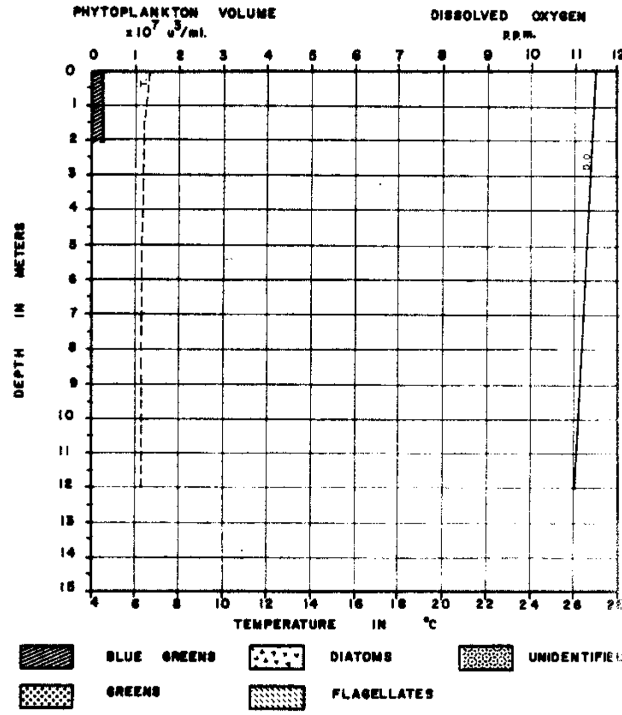


CLEAR LAKE STA. 3

DATE 2-13-69

AVG. u^3/ml. ——

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.10	0.5	0.03	0.53	
BOTT.	0.04	0.14	0.5	0.00	0.53	

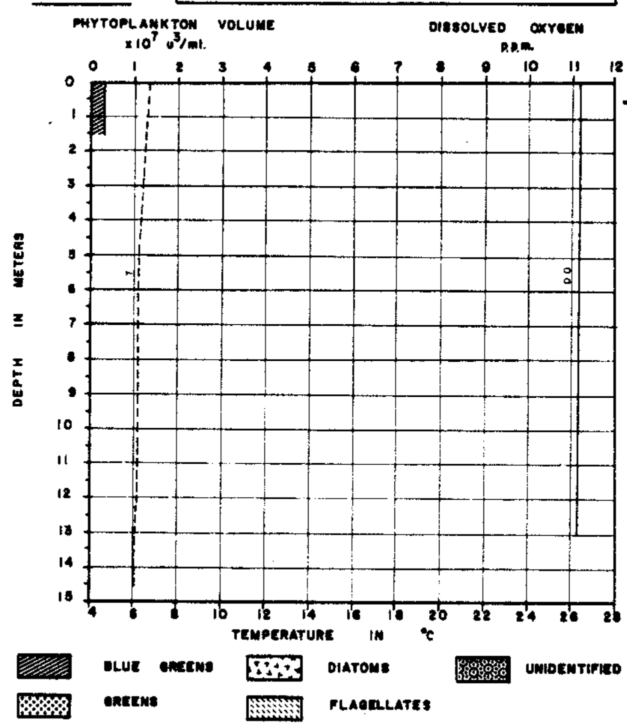


CLEAR LAKE STA. 4

DATE 2-13-69

AVG. u^3/ml. ——

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.10	0.6	0.00	0.44	
BOTT.	0.06	0.09	0.6	0.00	0.39	

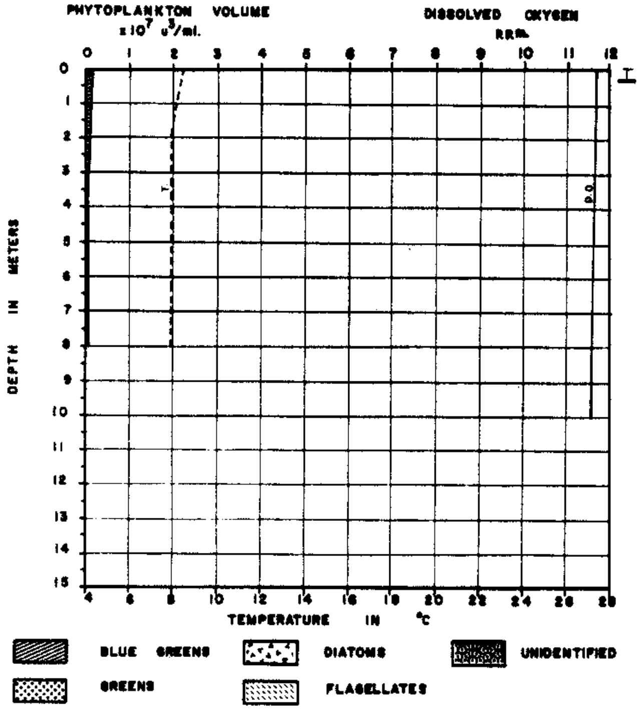


CLEAR LAKE STA. 1

DATE 3-11-69

AVG. u^3/ml. 446,236

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.15	0.4	0.00	0.35	
BOTT.	0.05	0.19	0.3	0.00	0.34	

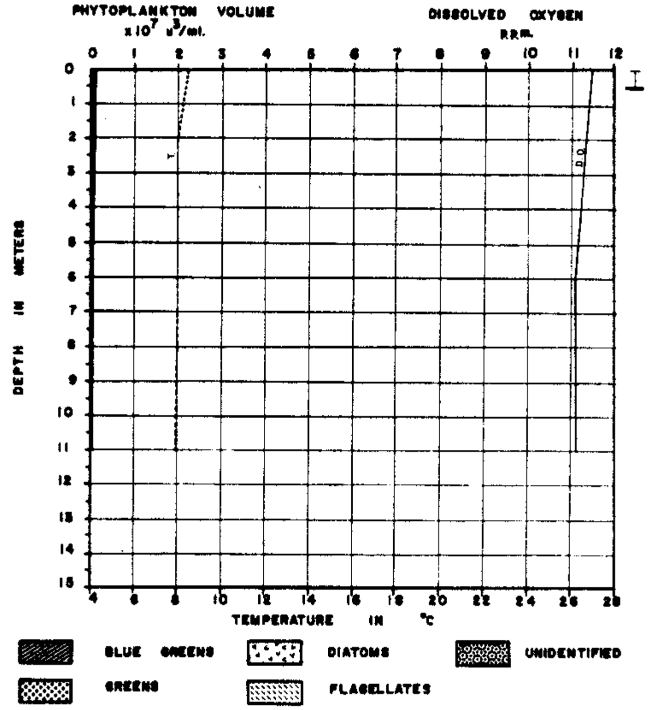


CLEAR LAKE STA. 3

DATE 3-11-69

AVG. u^3/ml. 490,102

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.20	0.4	0.00	0.50	
BOTT.	0.06	0.18	0.4	0.00	0.48	

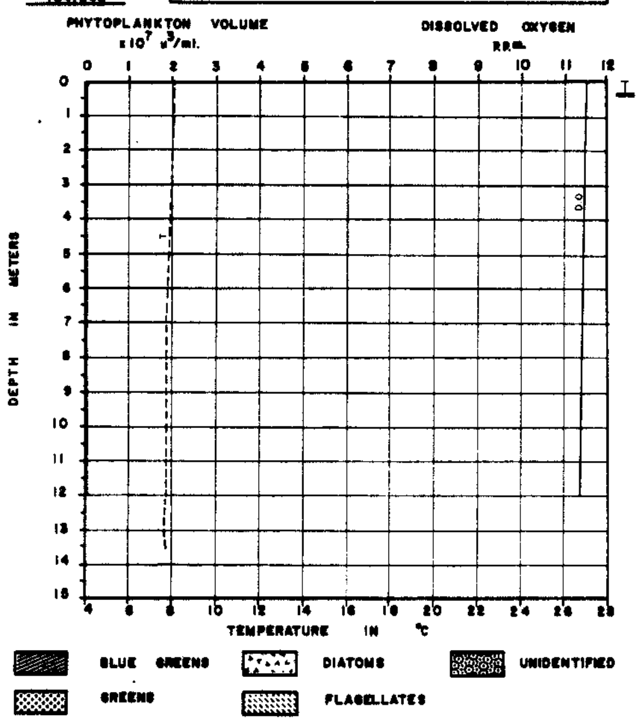


CLEAR LAKE STA. 4

DATE 3-11-69

AVG. u^3/ml. 184,645

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.6	0.4	0.00	0.43	
BOTT.	0.05	0.6	0.4	0.00	0.43	

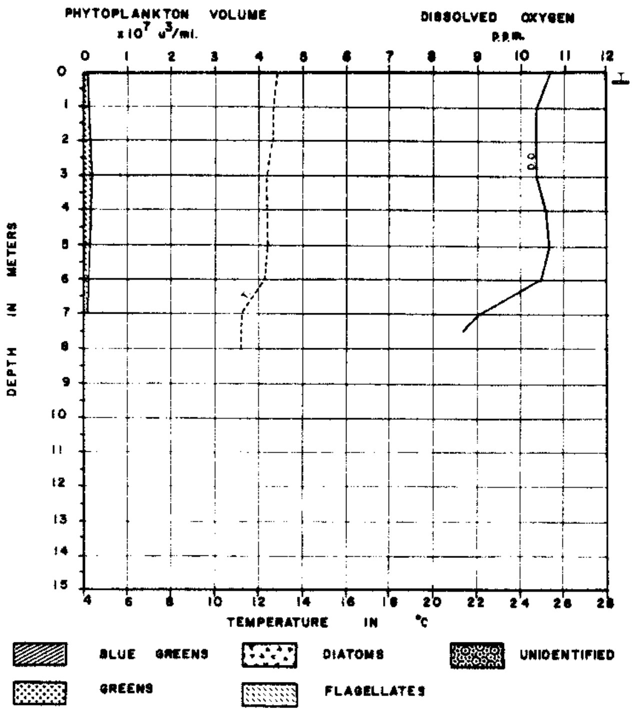


CLEAR LAKE STA. 1

DATE 4-2-69

AVG. u^3/ml. 601,175

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.05	0.13	0.4	0.00	0.33	
BOTT.	0.05	0.10	0.3	0.00	0.36	

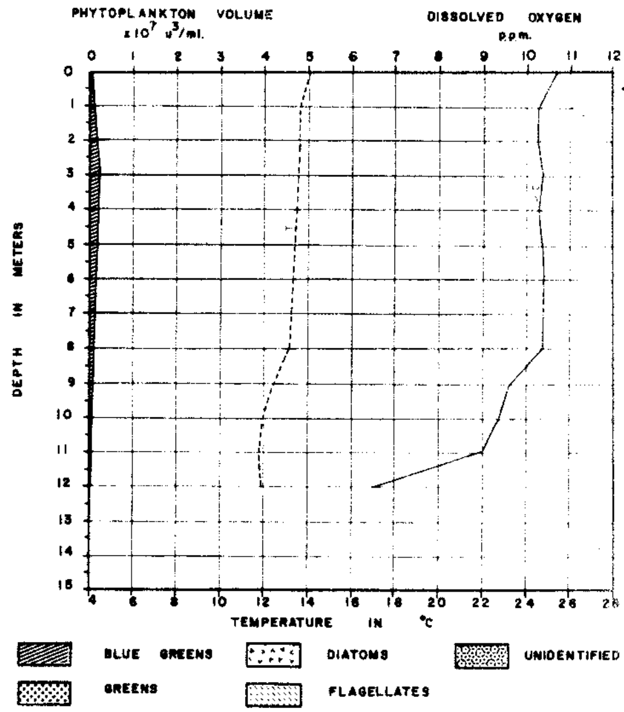


CLEAR LAKE STA. 3

DATE 4-2-69

AVG. u^3/ml. 672,259

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l
SURF.	0.04	0.09	0.4	0.00	0.46	
BOTT.	0.04	0.08	0.5	0.02	0.42	

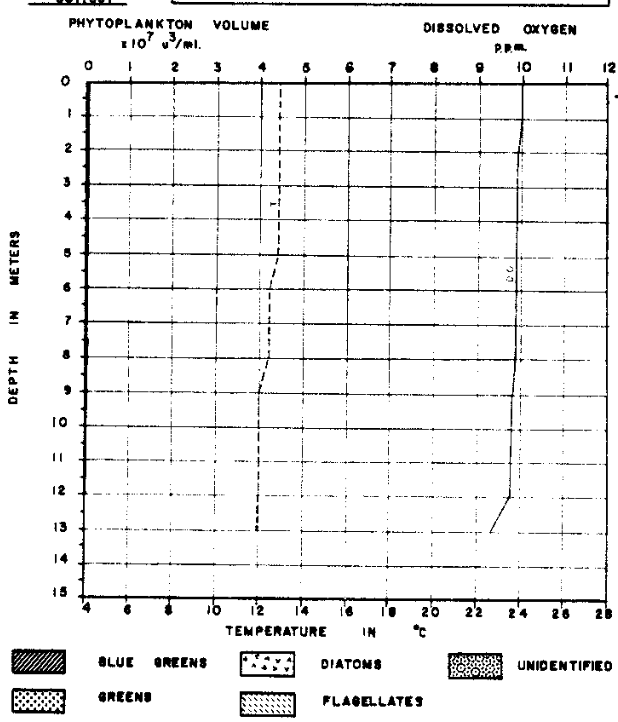


CLEAR LAKE STA. 4

DATE 4-2-69

AVG. u^3/ml. 367,057

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.13	0.3	0.03	0.40	
BOTT.	0.06	0.11	0.3	0.00	0.42	

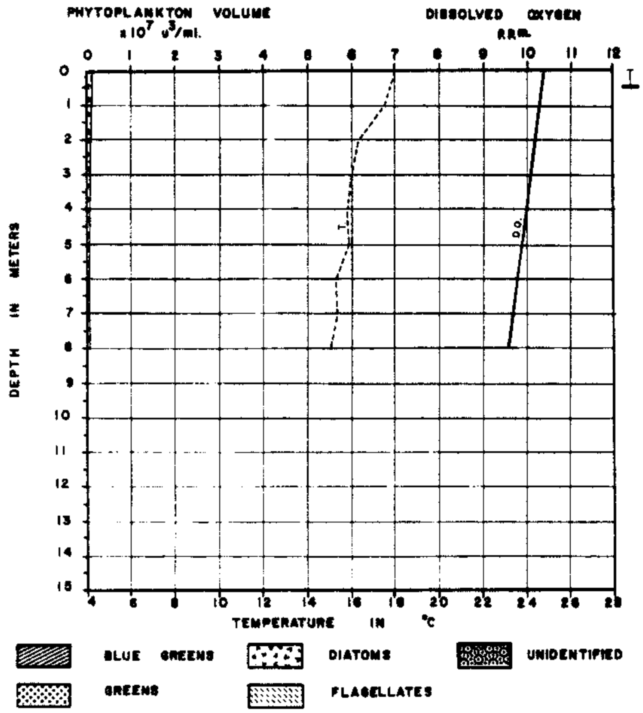


CLEAR LAKE STA. 1

DATE 4-17-69

AVG. u^3/ml.
338,165

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.16	0.3	0.00	0.31	
BOTT.	0.08	0.16	0.3	0.00	0.33	

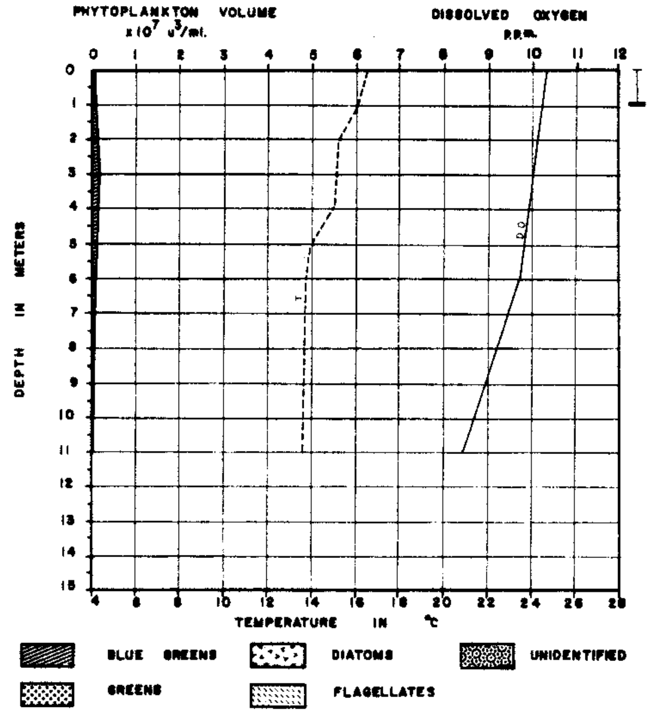


CLEAR LAKE STA. 3

DATE 4-17-69

AVG. u^3/ml.
1,052,185

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.10	0.4	0.00	0.40	
BOTT.	0.04	0.17	0.4	0.01	0.41	

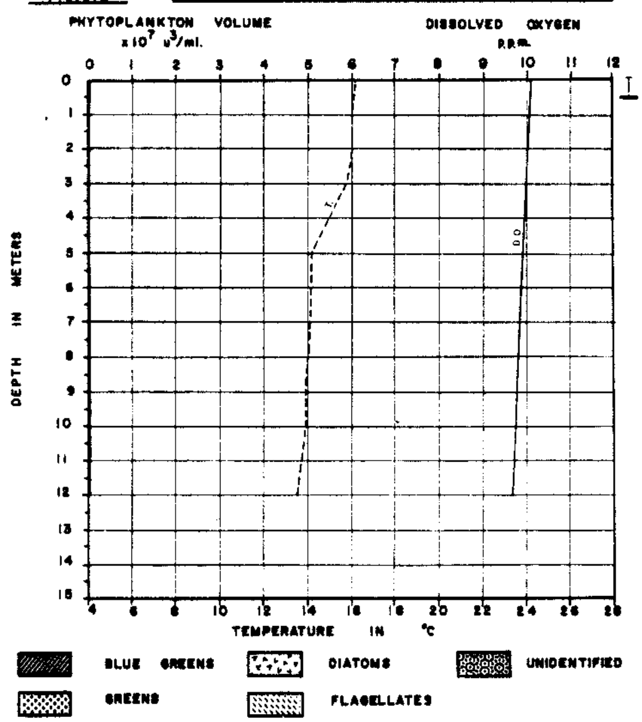


CLEAR LAKE STA. 4

DATE 4-17-69

AVG. u^3/ml.
143,072

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.12	0.4	0.00	0.42	
BOTT.	0.06	0.09	0.4	0.00	0.42	

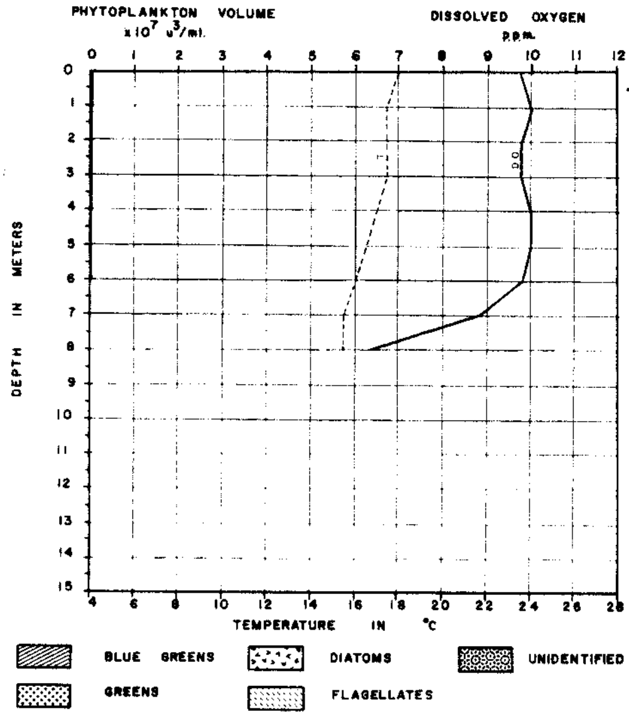


CLEAR LAKE STA. I

DATE 4-29-69

AVG. u^3/ml
64,555

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l
SURF.	0.03	0.12	0.4	0.00	0.34	
BOTT.	0.05	0.31	0.4	0.00	0.36	

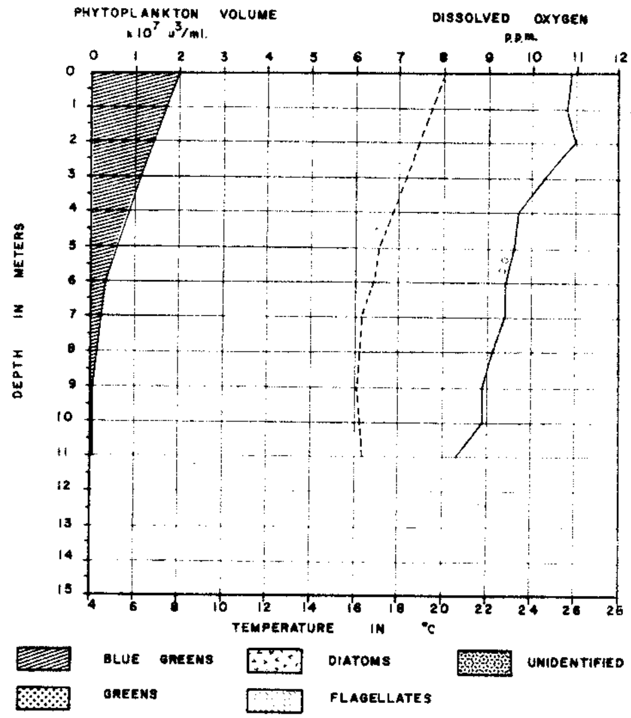


CLEAR LAKE STA. 3

DATE 4-29-69

AVG. u^3/ml
6,858,140

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l
SURF.	0.03	0.19	0.8	0.00	0.33	
BOTT.	0.04	0.12	0.4	0.00	0.39	

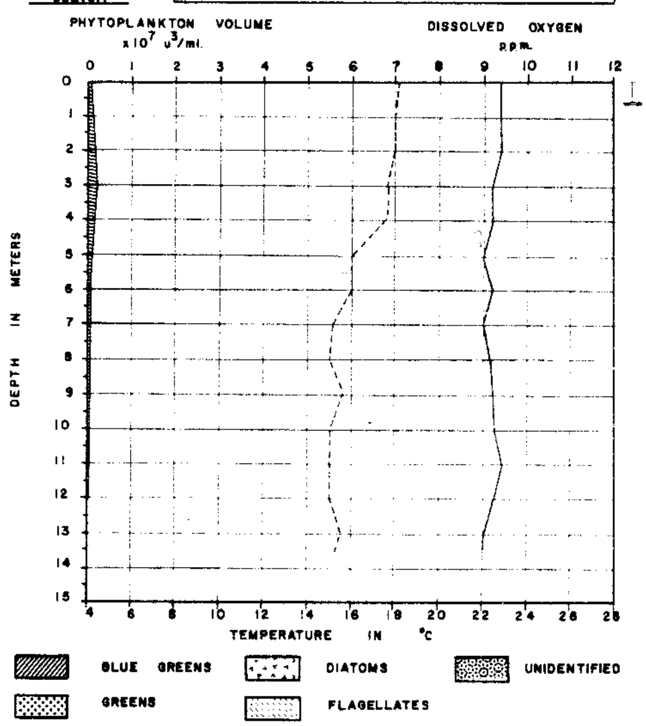


CLEAR LAKE STA. 4

DATE 4-29-69

AVG. u^3/ml
352,317

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l
SURF.	0.04	0.09	0.4	0.00	0.41	
BOTT.	0.04	0.11	0.4	0.00	0.41	

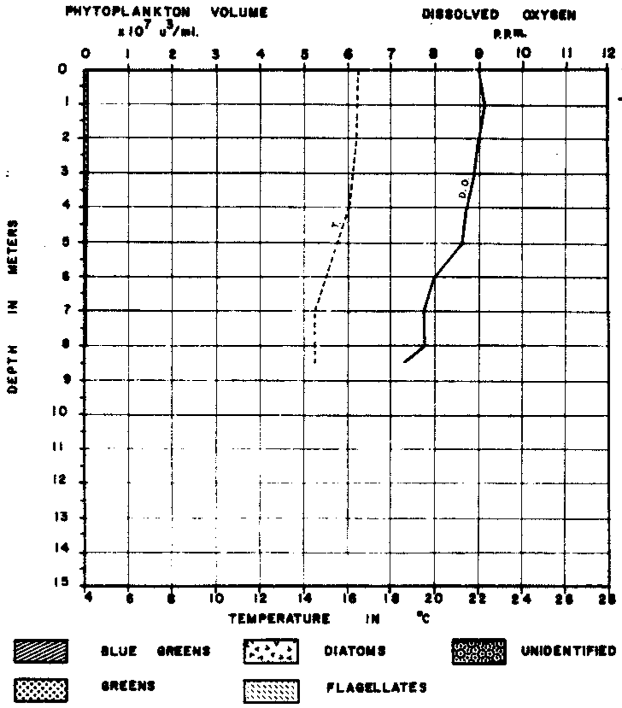


CLEAR LAKE STA. 1

DATE 5-13-69

AVG. u^3/ml. 148,992

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	.06	.06	0.3	0.00	0.29	
BOTT.	.06	.07	0.3	0.00	0.34	

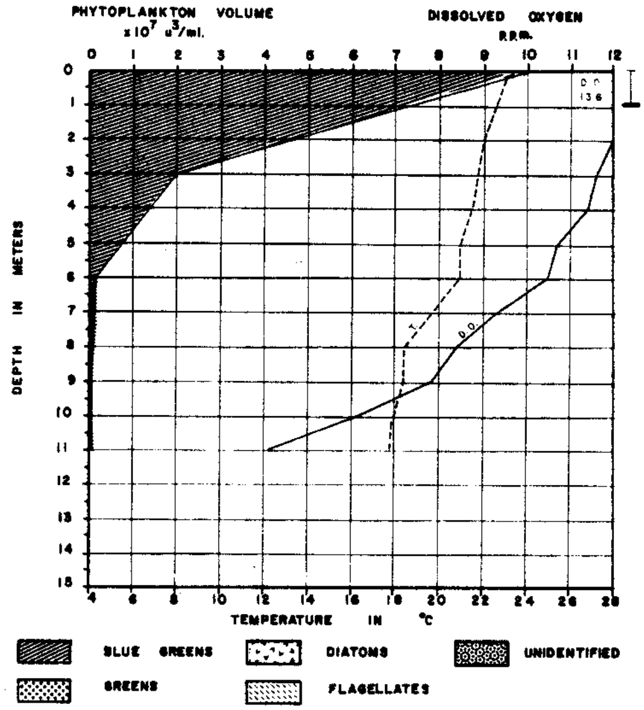


CLEAR LAKE STA. 3

DATE 5-13-69

AVG. u^3/ml. 19,777,386

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.09	1.7	0.00	0.02	
BOTT.	0.04	0.06	0.3	0.01	0.33	

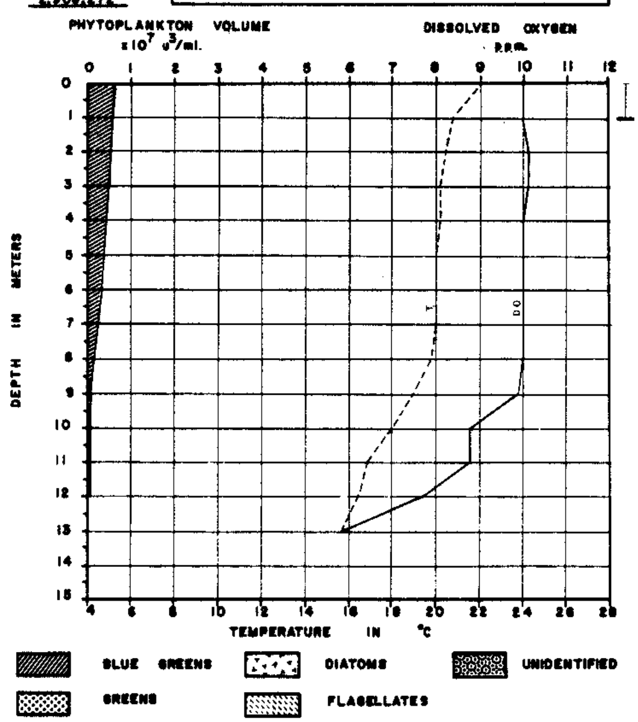


CLEAR LAKE STA. 4

DATE 5-13-69

AVG. u^3/ml. 2,909,272

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.03	0.4	0.00	0.23	
BOTT.	0.03	0.07	0.4	0.02	0.38	

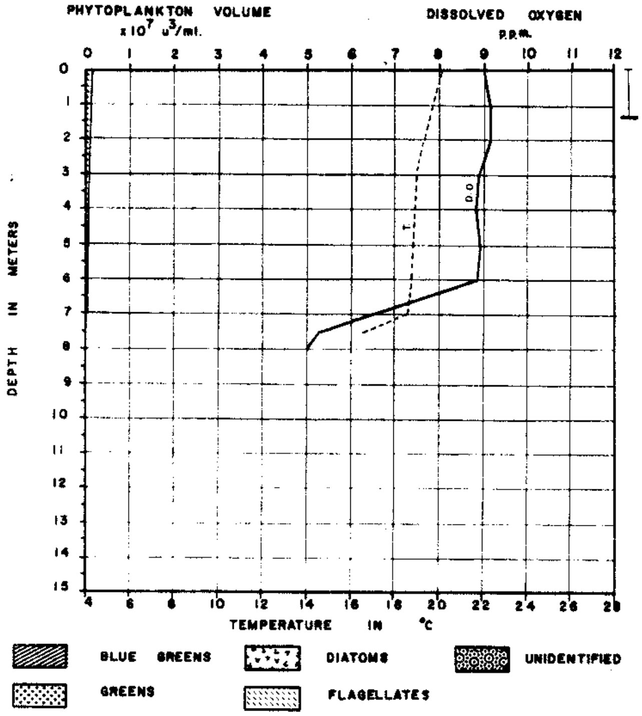


CLEAR LAKE STA. 1

DATE 5-27-69

AVG. u^3/ml.
385,250

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	.03	.08	0.1	0.01	0.22	
BOTT.	.05	.16	0.2	0.05	0.25	

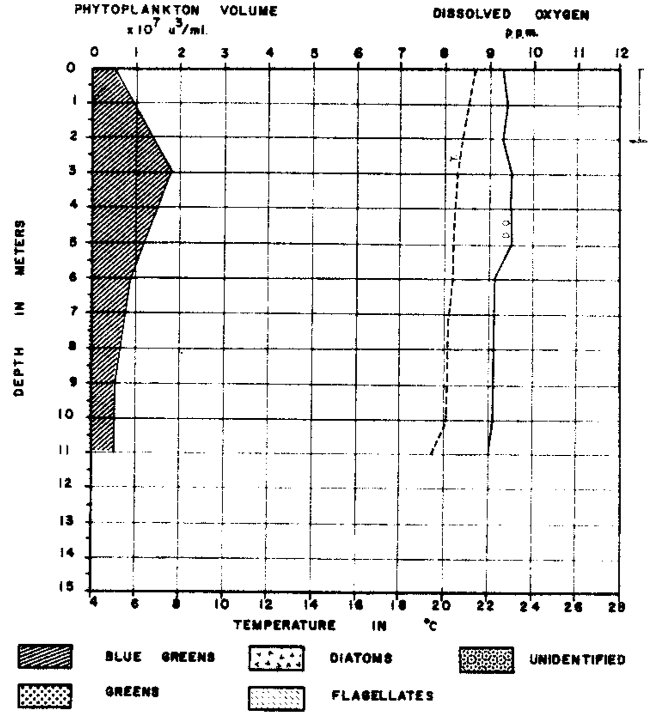


CLEAR LAKE STA. 3

DATE 5-27-69

AVG. u^3/ml.
9,977,339

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	.19	0.4	0.05	0.02	
BOTT.	0.01	0.04	0.5	0.06	0.04	

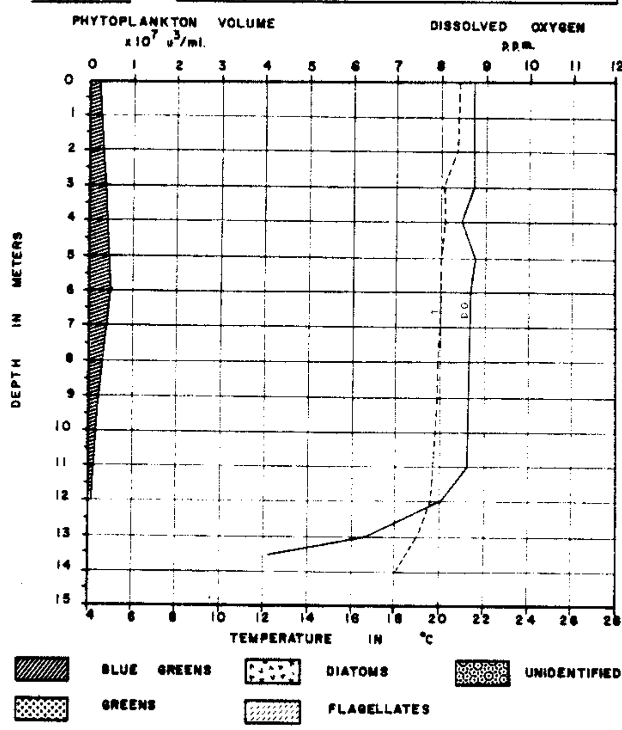


CLEAR LAKE STA. 4

DATE 5-27-69

AVG. u^3/ml.
2,467,617

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.06	0.4	0.02	0.15	
BOTT.	0.03	0.14	0.5	0.03	0.20	

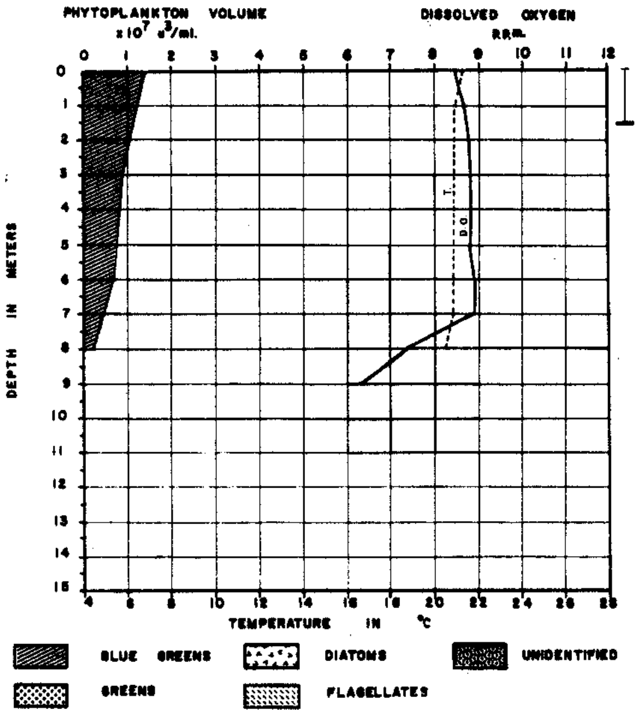


CLEAR LAKE STA. 1

DATE 6-11-69

AVG. u³/ml. 8,579,797

	ORTHO PO4	TOTAL P-P	ORG N -N	NH3 -N	NO3 -N	ALK mg/l.
SURF.	.02	.17	0.6	0.00	0.05	
BOTT.	.02	.07	0.3	0.06	0.04	

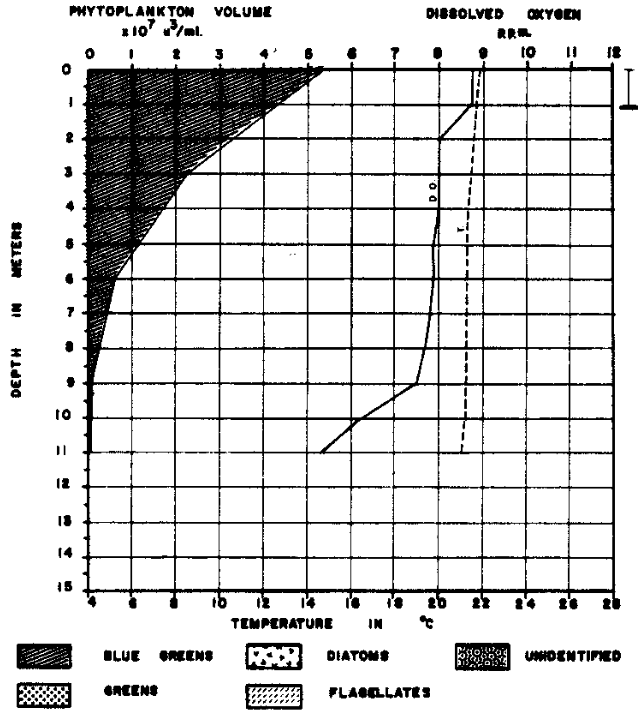


CLEAR LAKE STA. 3

DATE 6-11-69

AVG. u³/ml. 15,947,324

	ORTHO PO4	TOTAL P-P	ORG N -N	NH3 -N	NO3 -N	ALK mg/l.
SURF.	0.03	0.27	0.8	0.06	0.03	
BOTT.	0.04	0.20	0.6	0.20	0.04	

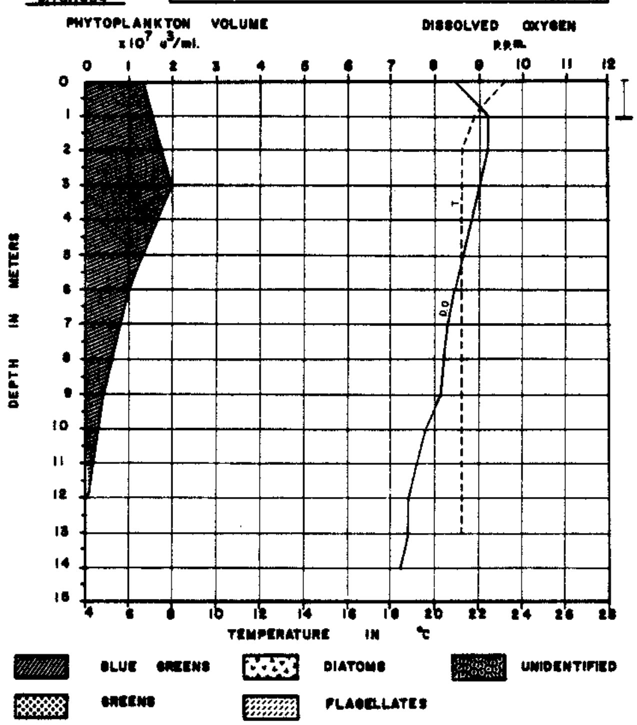


CLEAR LAKE STA. 4

DATE 6-11-69

AVG. u³/ml. 9,751,654

	ORTHO PO4	TOTAL P-P	ORG N -N	NH3 -N	NO3 -N	ALK mg/l.
SURF.	0.03	0.10	0.7	0.02	0.06	
BOTT.	0.05	0.19	0.5	0.11	0.06	

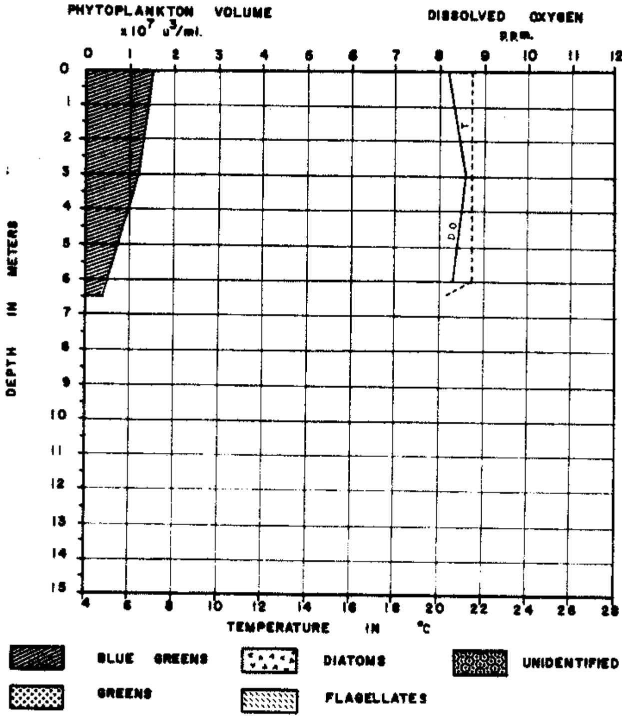


CLEAR LAKE STA. 1

DATE 6-25-69

AVG. u^3/ml. 11,206,928

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	.02	.07	0.5	0.00	0.05	
BOTT.	.02	.09	0.4	0.00	0.04	

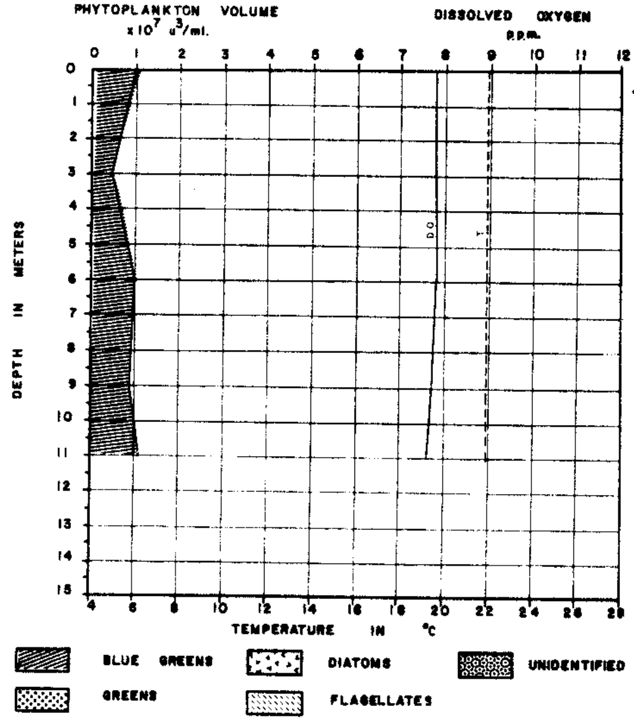


CLEAR LAKE STA. 3

DATE 6-25-69

AVG. u^3/ml. 8,664,968

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.11	0.6	0.06	0.04	
BOTT.	0.03	0.15	0.7	0.06	0.04	

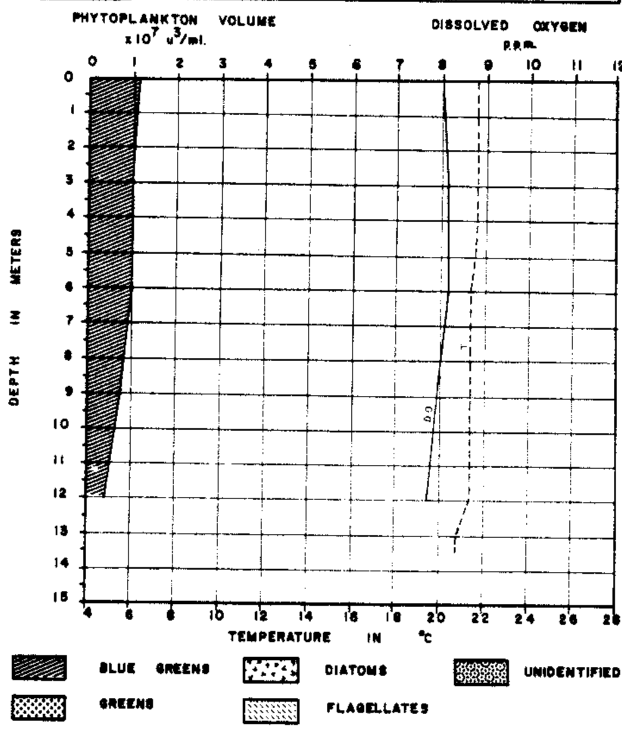


CLEAR LAKE STA. 4

DATE 6-25-69

AVG. u^3/ml. 8,792,379

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.13	0.5	0.04	0.08	
BOTT.	0.05	0.12	0.5	0.06	0.07	

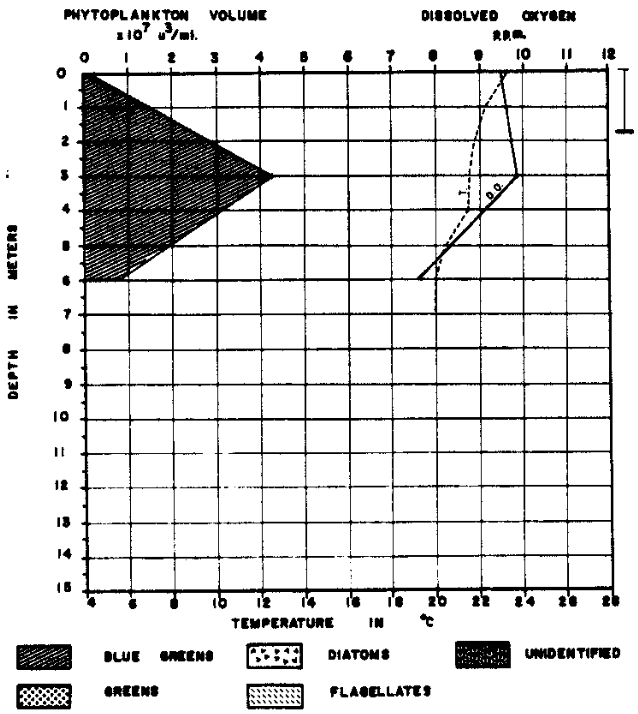


CLEAR LAKE STA. 1

DATE 7-2-69

AVG. u^3/ml. 21,852,947

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	.03	.10	0.4	0.00	0.08	
BOTT.	.04	.12	0.4	0.02	0.11	

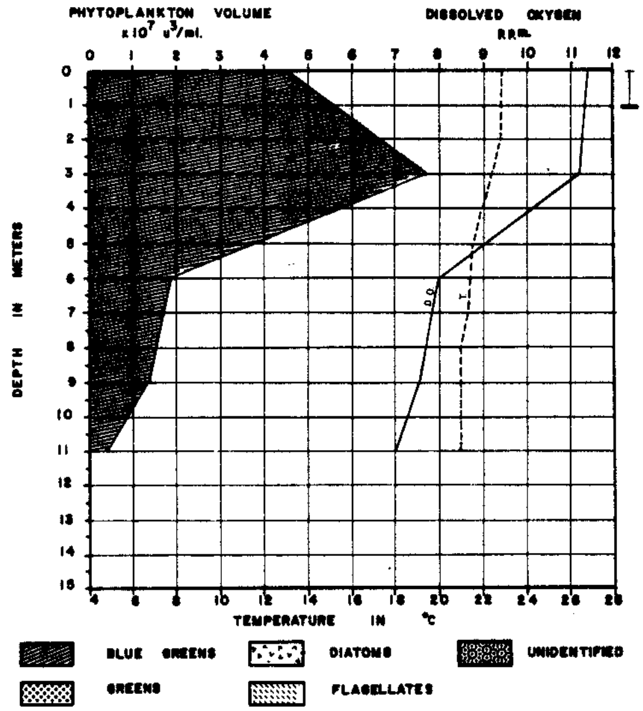


CLEAR LAKE STA. 3

DATE 7-3-69

AVG. u^3/ml. 36,616,791

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.12	1.3	0.00	0.03	
BOTT.	0.02	0.08	0.8	0.02	0.04	

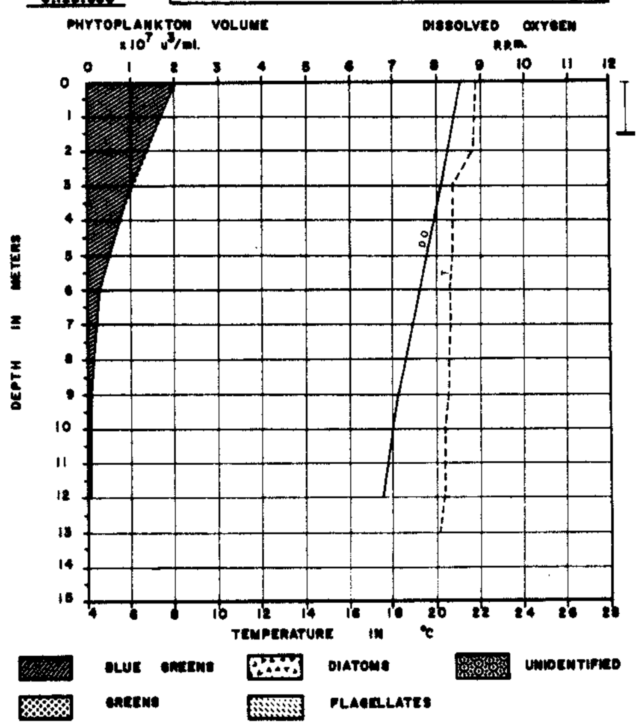


CLEAR LAKE STA. 4

DATE 7-3-69

AVG. u^3/ml. 6,125,865

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.11	0.8	0.07	0.07	
BOTT.	0.07	0.16	0.4	0.20	0.07	

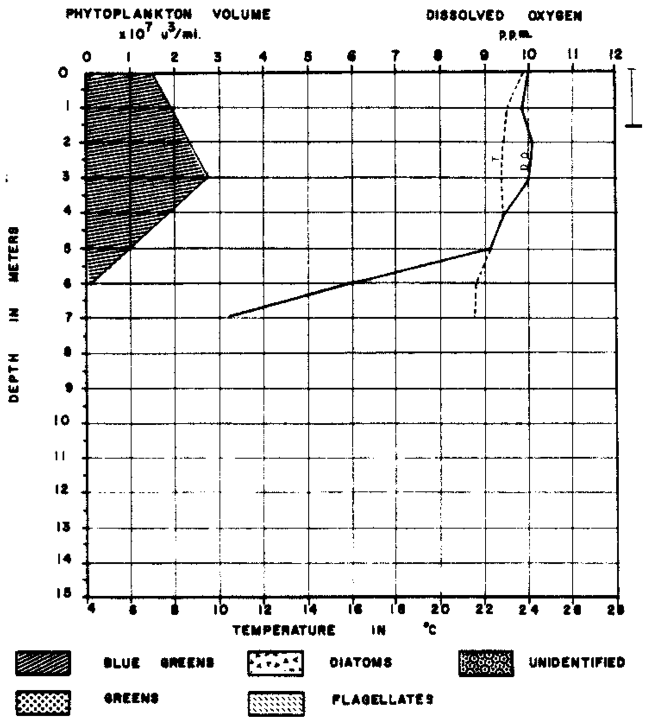


CLEAR LAKE STA. 1

DATE 7-9-69

AVG. u³/ml. 16,707,931

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	.01	.10	0.5	.08	.04	
BOTT.	.04	.08	0.4	.00	.09	

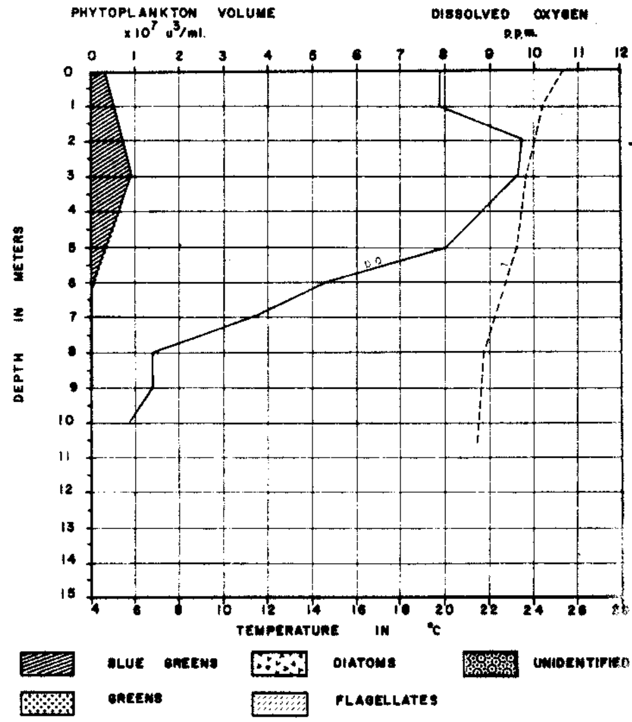


CLEAR LAKE STA. 3

DATE 7-9-69

AVG. u³/ml. 3,410,325

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.07	0.6	0.27	0.04	
BOTT.	0.14	0.14	0.5	0.45	0.04	

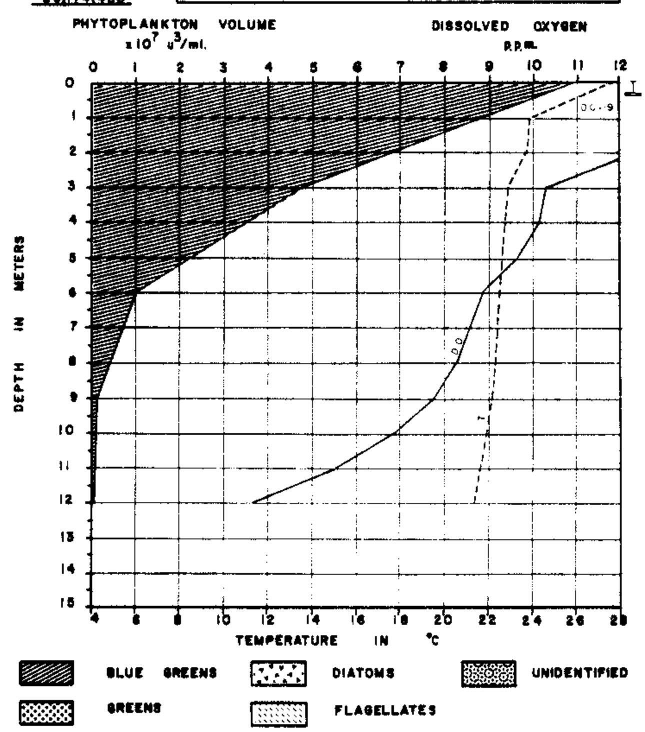


CLEAR LAKE STA. 4

DATE 7-9-69

AVG. u³/ml. 29,174,438

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.13	1.9	0.06	0.04	
BOTT.	0.06	0.12	0.4	0.14	0.12	

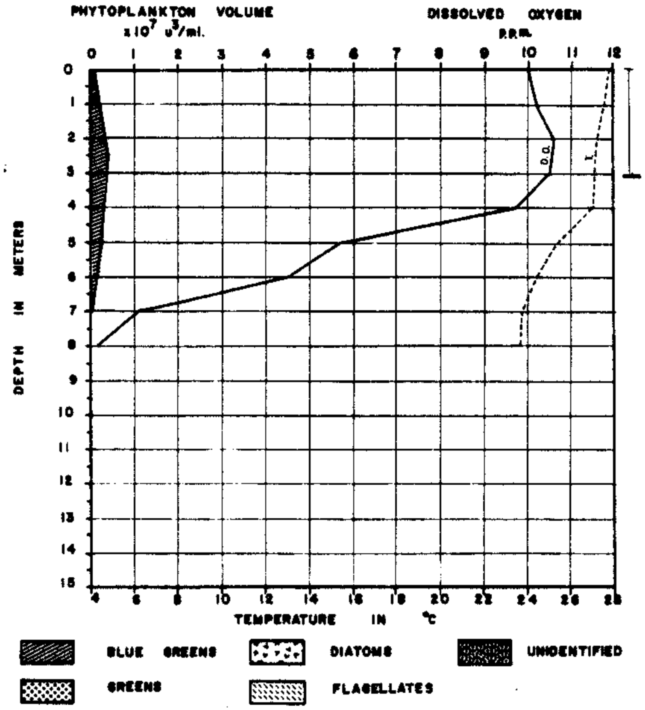


CLEAR LAKE STA. 1

DATE 7-23-69

AVG. u^3/ml. 2,386,750

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.06	0.4	0.00	0.01	
BOTT.	0.16	0.16	0.5	0.14	0.03	

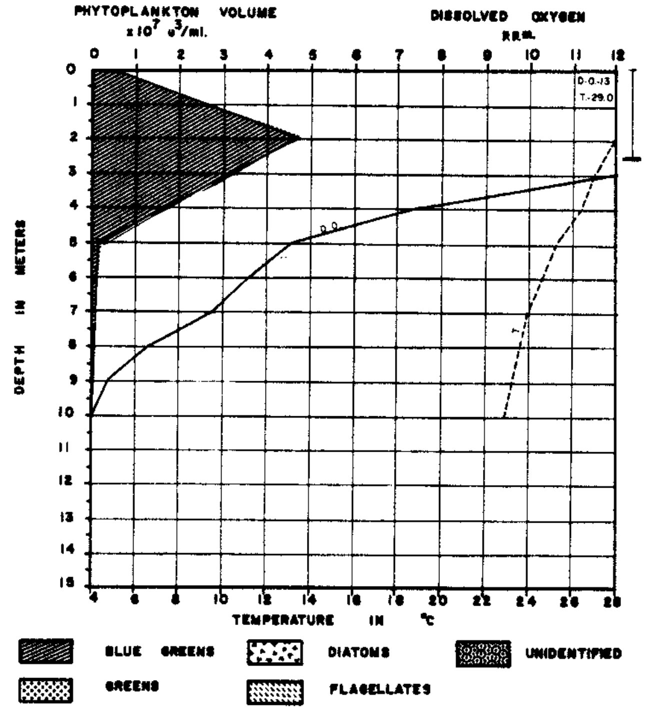


CLEAR LAKE STA. 3

DATE 7-23-69

AVG. u^3/ml. 2,661,063

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.08	0.8	0.00	0.02	
BOTT.	0.38	0.42	0.6	0.76	0.02	

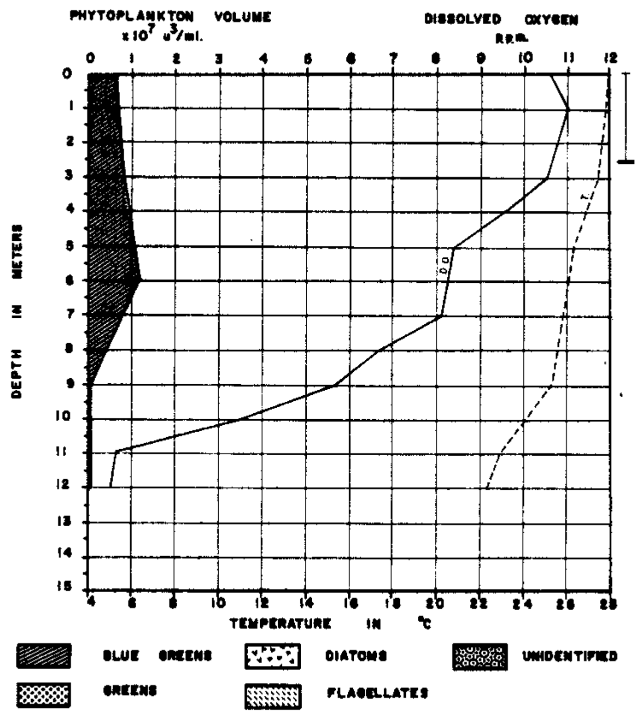


CLEAR LAKE STA. 4

DATE 7-23-69

AVG. u^3/ml. 6,125,898

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.04	0.6	0.00	0.00	
BOTT.	0.46	0.46	0.4	0.60	0.01	

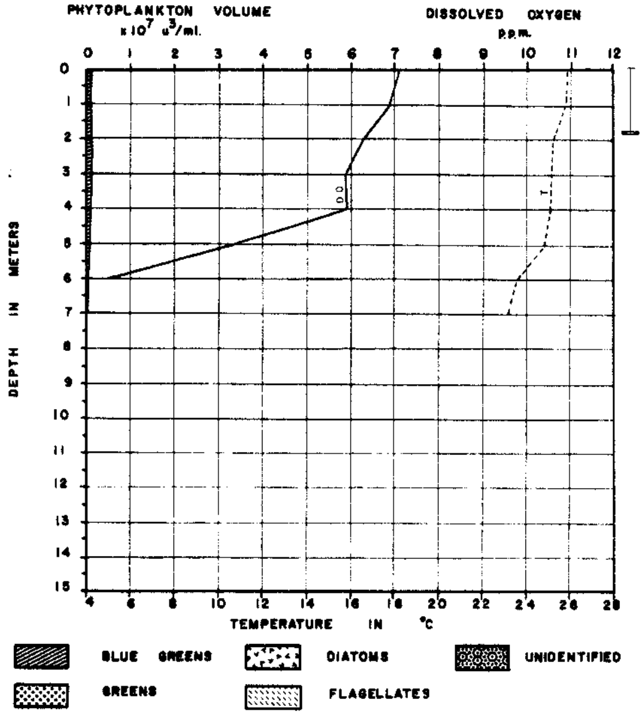


CLEAR LAKE STA. 1

DATE 8-6-69

AVG. u^3/ml. 1,316,066

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.11	0.15	0.5	0.00	0.04	
BOTT.	0.31	0.55	0.4	0.13	0.03	

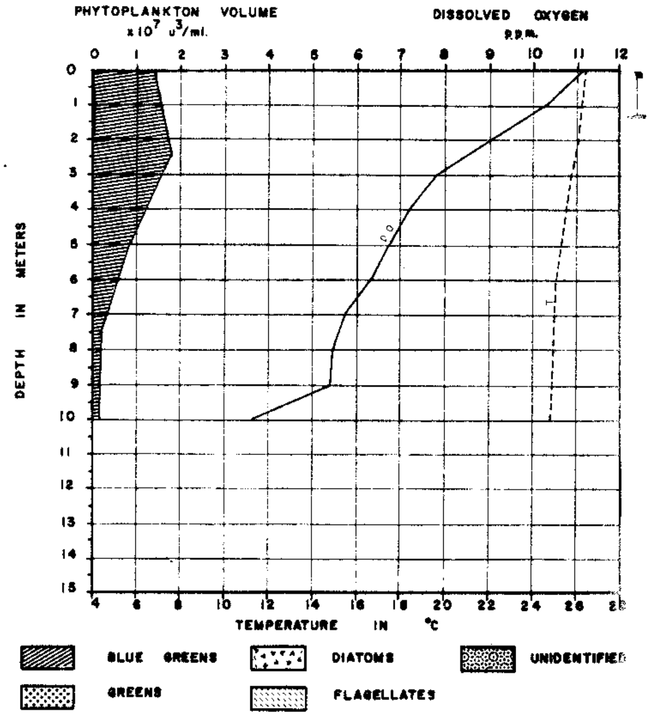


CLEAR LAKE STA. 3

DATE 8-6-69
1400 PST

AVG. u^3/ml. 9,907,915

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.08	0.8	0.00	0.03	
BOTT.	0.06	0.12	0.6	0.25	0.04	

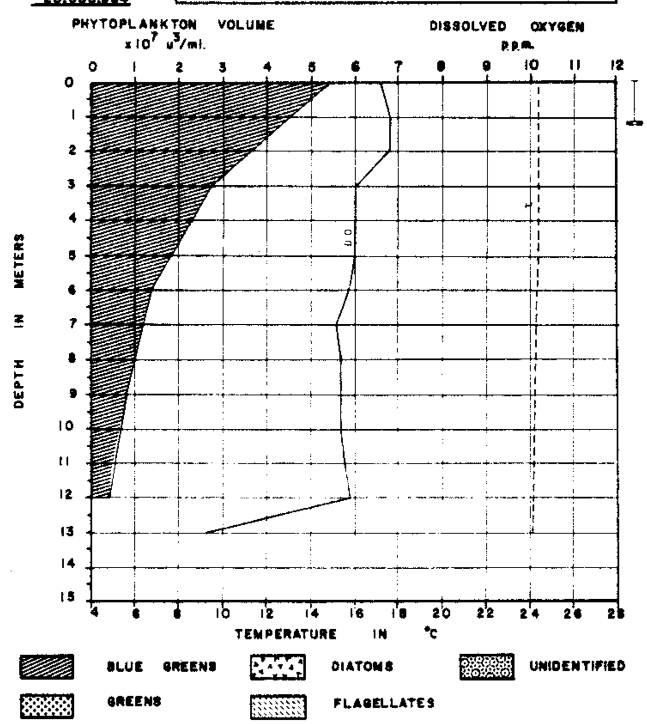


CLEAR LAKE STA. 4

DATE 8-6-69

AVG. u^3/ml. 20,365,964

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.09	0.17	0.6	0.05	0.04	
BOTT.	0.10	0.16	0.6	0.10	0.04	

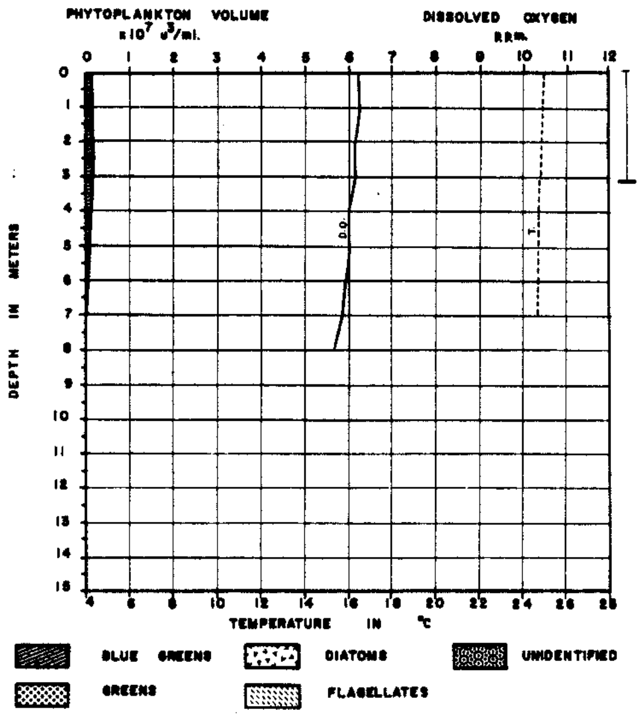


CLEAR LAKE STA. I

DATE 8-19-69

AVG. u^3/ml. 1,882,388

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.22	0.23	0.4	0.00	0.01	
BOTT.	0.23	0.28	0.4	0.01	0.02	

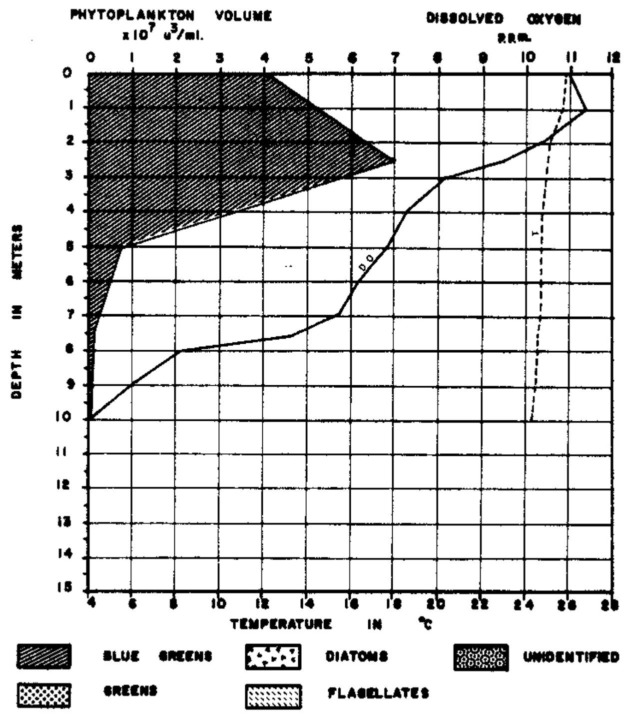


CLEAR LAKE STA. 3

DATE 8-19-69

AVG. u^3/ml. 24,775,896

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.09	0.28	1.8	0.00	0.01	
BOTT.	0.21	0.29	0.6	0.48	0.01	

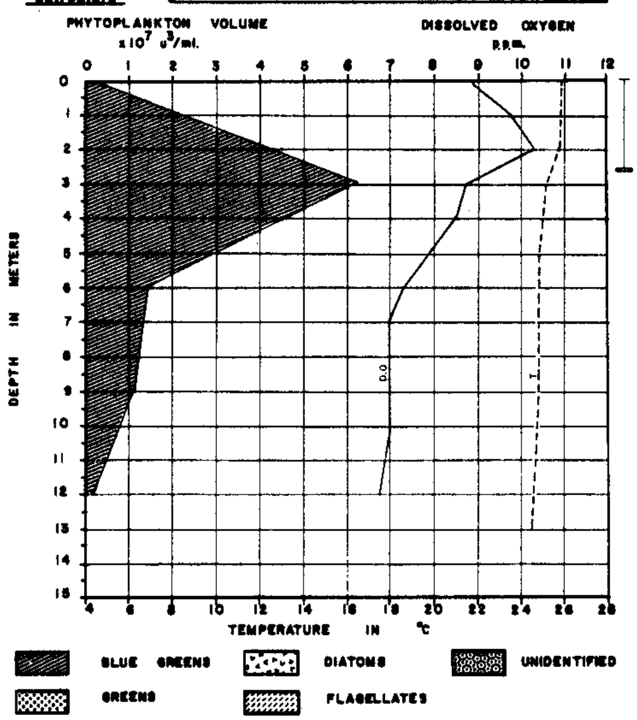


CLEAR LAKE STA. 4

DATE 8-19-69

AVG. u^3/ml. 22,782,013

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.11	0.17	0.6	0.00	0.02	
BOTT.	0.12	0.16	0.8	0.09	0.02	

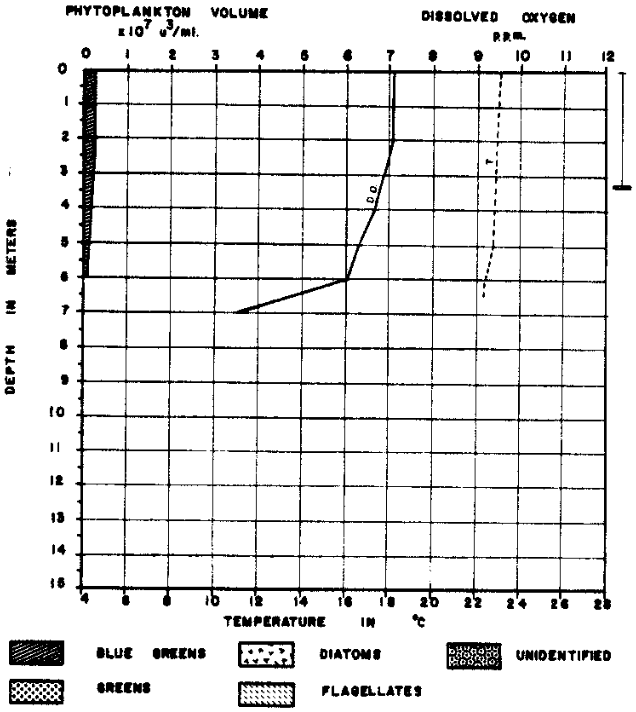


CLEAR LAKE STA. 1

DATE 9-2-69

AVG. u^3/ml. 1,900,900

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.22	0.22	0.4	0.00	0.00	
BOTT.	0.24	0.24	0.4	0.00	0.00	

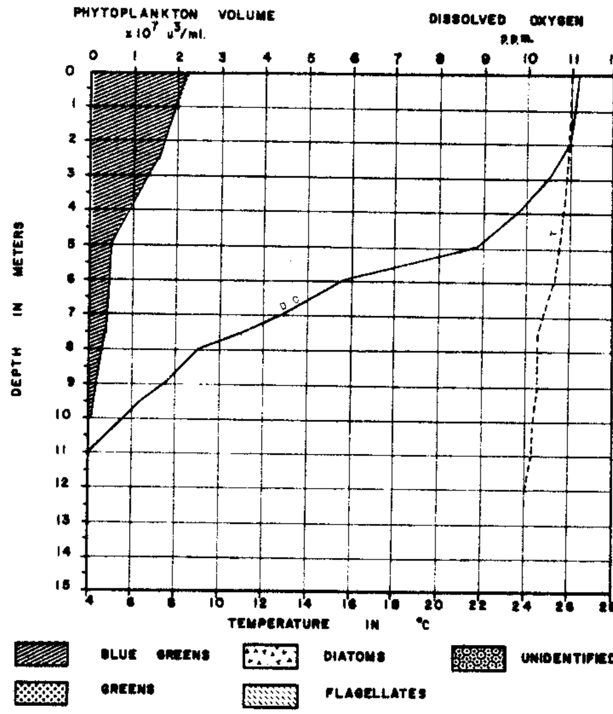


CLEAR LAKE STA. 3

DATE 9-2-69

AVG. u^3/ml. 9,373,920

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.10	0.12	0.8	0.00	0.00	
BOTT.	0.12	0.17	0.5	0.13	0.00	

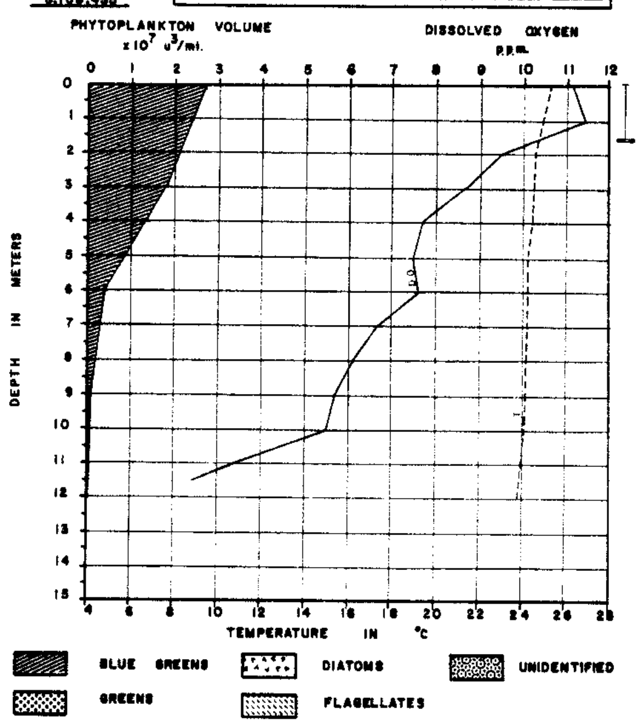


CLEAR LAKE STA. 4

DATE 9-2-69

AVG. u^3/ml. 8,759,435

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.14	0.22	1.1	0.05	0.00	
BOTT.	0.21	0.23	0.6	0.27	0.01	

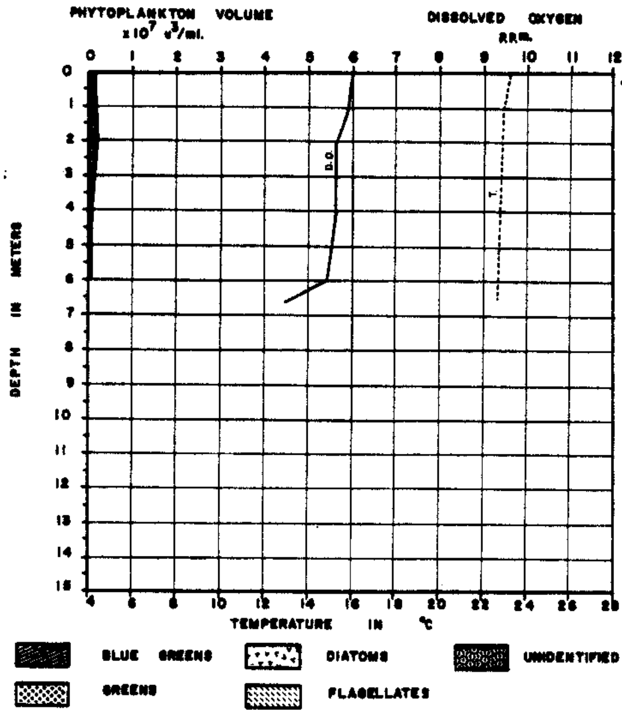


CLEAR LAKE STA. 1

DATE 9-17-69

AVG. u^3/ml. 848,884

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.32	0.37	0.8	0.00	0.01	
BOTT.	0.32	0.34	0.6	0.00	0.02	

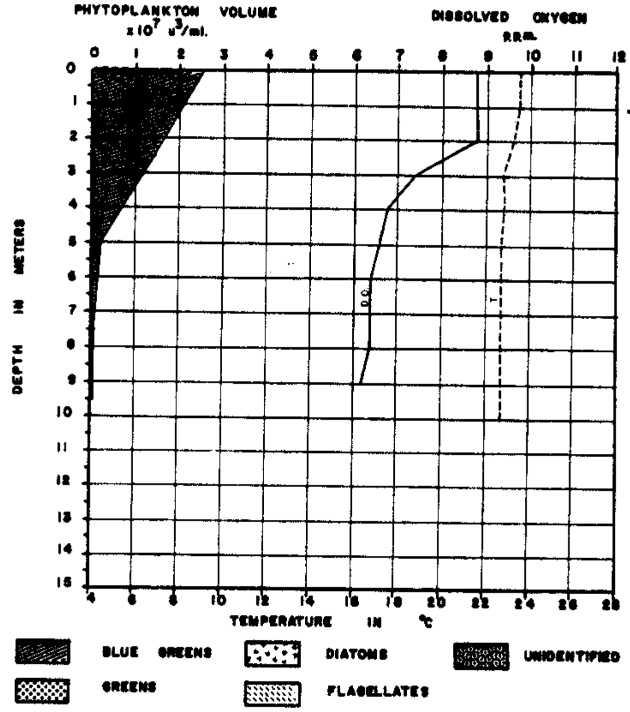


CLEAR LAKE STA. 3

DATE 9-17-69

AVG. u^3/ml. 8,079,736

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.14	1.1	0.00	0.01	
BOTT.	0.06	0.12	0.6	0.03	0.02	

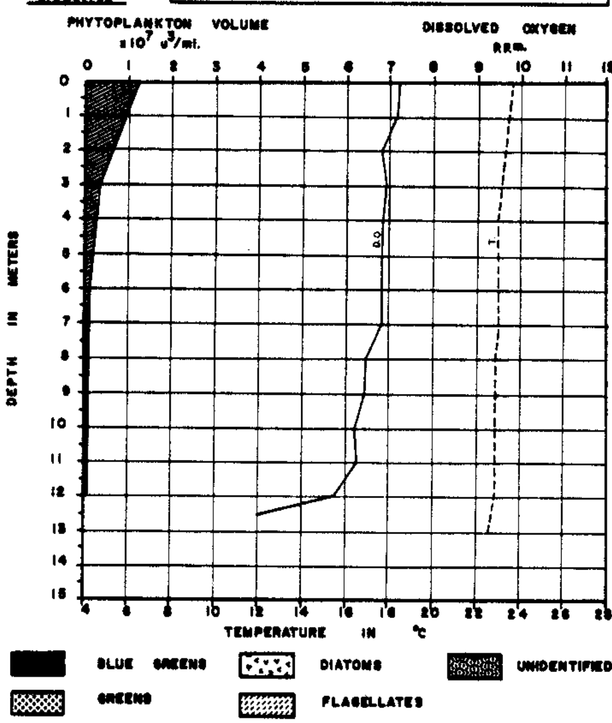


CLEAR LAKE STA. 4

DATE 9-17-69

AVG. u^3/ml. 2,820,785

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.14	0.21	0.8	0.00	0.02	
BOTT.	0.18	0.23	0.6	0.00	0.02	

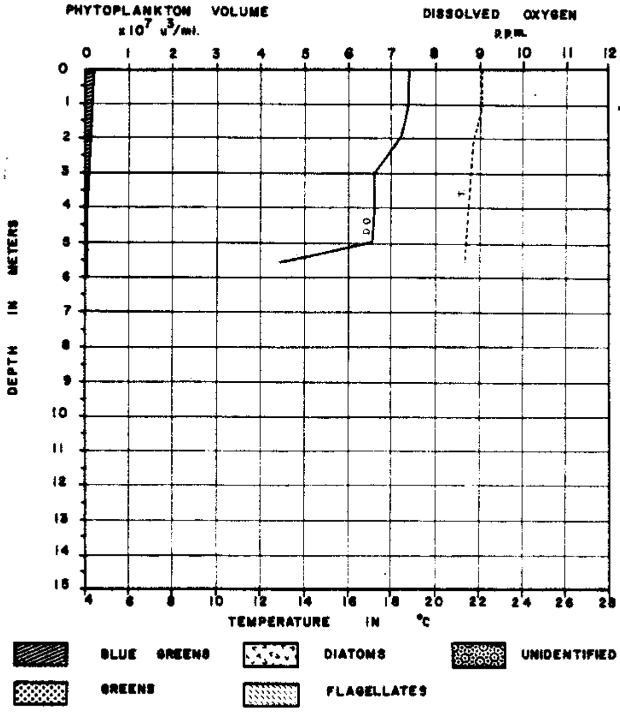


CLEAR LAKE STA. 1

DATE 9-30-69

AVG. u^3/ml. 749,633

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.19	0.22	0.4	0.00	0.04	
BOTT.	0.20	0.23	0.4	0.01	0.06	

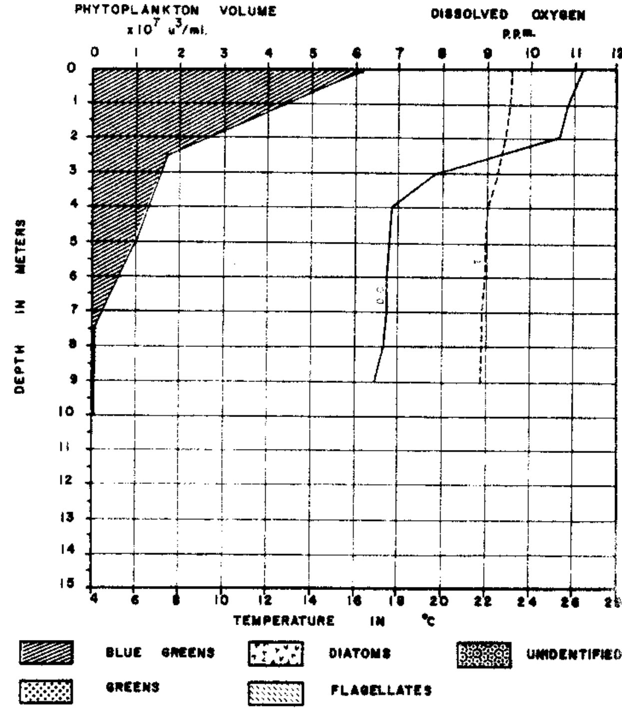


CLEAR LAKE STA. 3

DATE 9-30-69

AVG. u^3/ml. 12,590,836

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.05	0.09	1.4	0.06	0.03	
BOTT.	0.06	0.10	0.5	0.09	0.04	

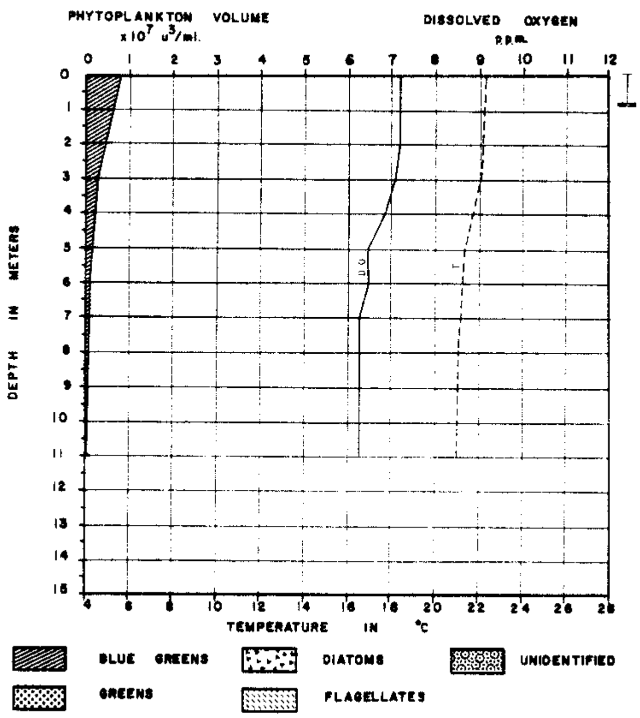


CLEAR LAKE STA. 4

DATE 9-30-69

AVG. u^3/ml. 2,849,143

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.13	0.19	0.5	0.02	0.06	
BOTT.	0.14	0.18	0.4	0.01	0.11	

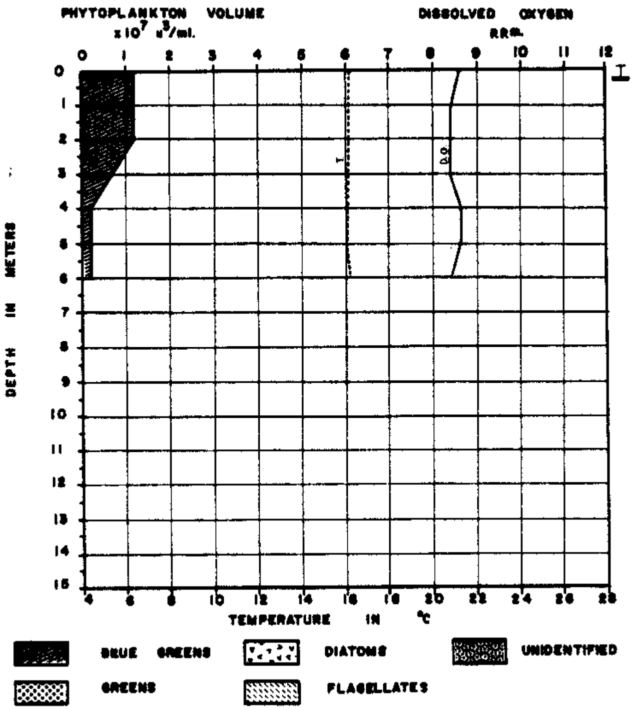


CLEAR LAKE STA. I

DATE 10-16-69

AVG. u^3/ml. 7,427,360

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.20	0.25	0.7	0.00	0.08	
BOTT.	0.19	0.24	0.4	0.01	0.20	

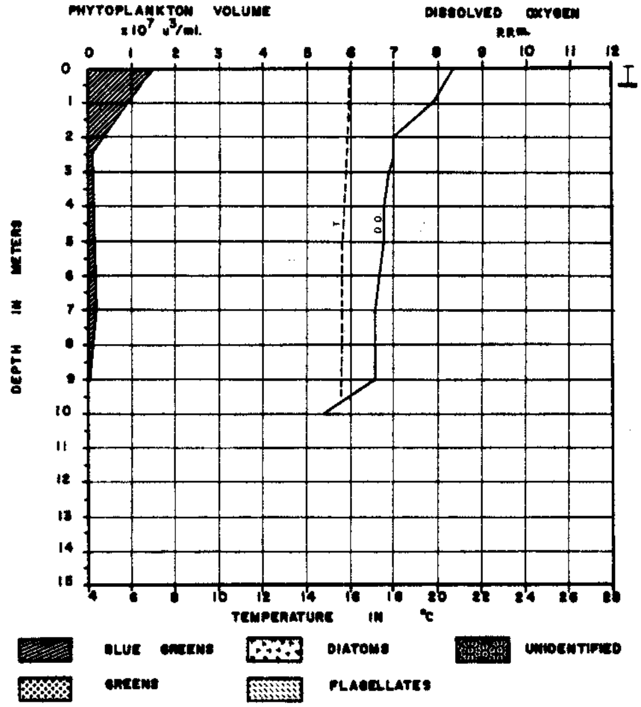


CLEAR LAKE STA. 3

DATE 10-20-69

AVG. u^3/ml. 3,081,140

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.14	1.3	0.23	0.15	
BOTT.	0.04	0.11	0.7	0.32	0.15	

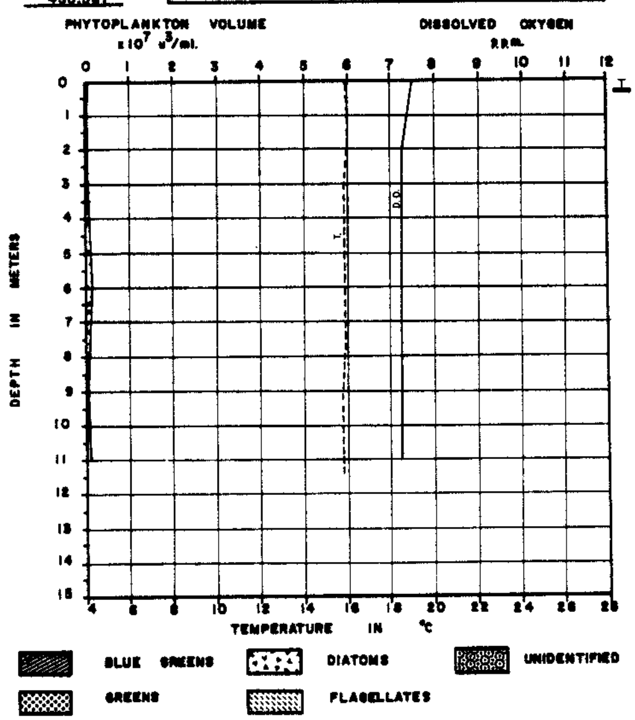


CLEAR LAKE STA. 4

DATE 10-20-69

AVG. u^3/ml. 430,567

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.12	0.18	0.8	0.05	0.25	
BOTT.	0.10	0.19	0.8	0.07	0.24	

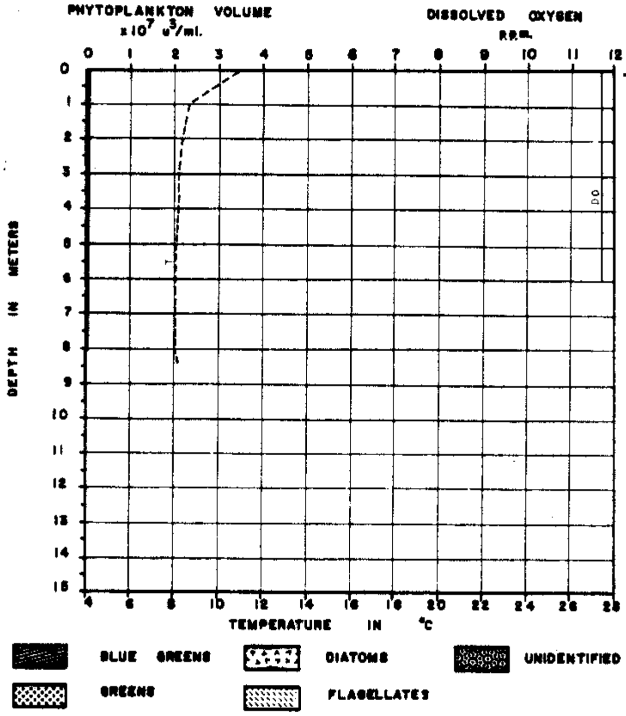


CLEAR LAKE STA. I

DATE I-18-70

AVG. u^3/ml. 134,386

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.09	0.17	0.4	0.00	0.39	
BOTT.	0.12	0.13	0.4	0.00	0.40	

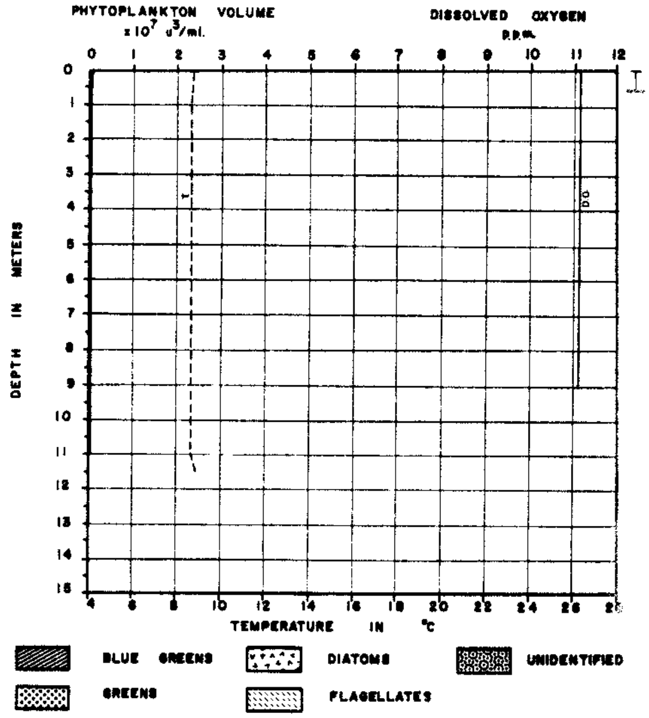


CLEAR LAKE STA. 3

DATE I-18-70

AVG. u^3/ml. 182,873

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.05	0.08	0.4	0.00	0.61	
BOTT.	0.06	0.09	0.4	0.00	0.61	

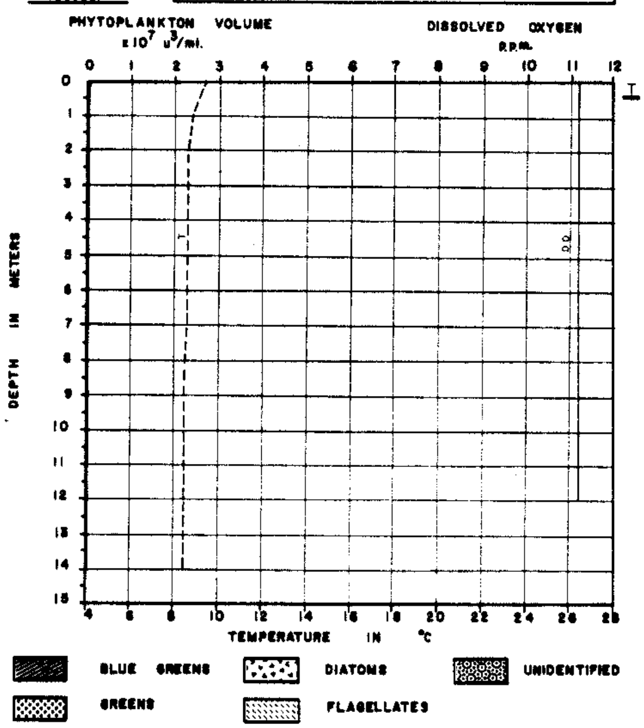


CLEAR LAKE STA. 4

DATE I-18-70

AVG. u^3/ml. 153,851

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.08	0.10	0.5	0.00	0.54	
BOTT.	0.08	0.12	0.4	0.00	0.54	

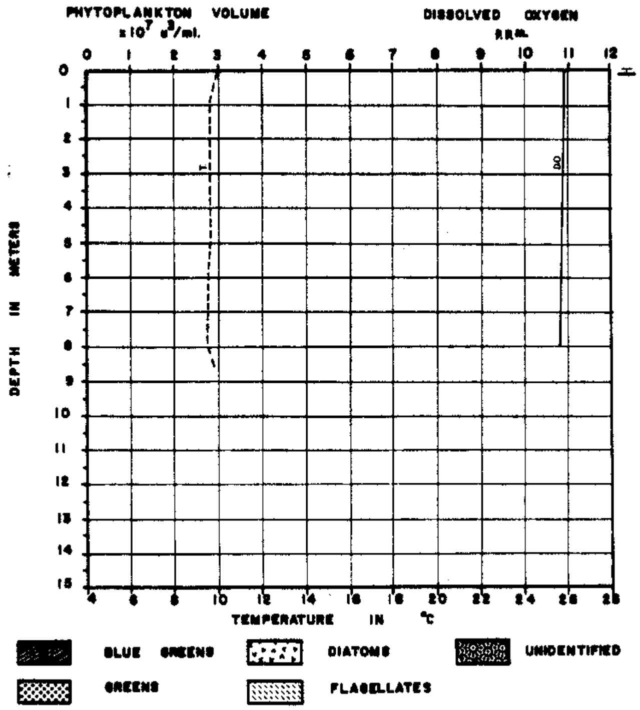


CLEAR LAKE STA. 1

DATE 2-9-70

AVG. u^3/ml. 72,134

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.14	0.14	0.4	0.01	0.19	
BOTT.	0.09	0.13	0.4	0.00	0.30	

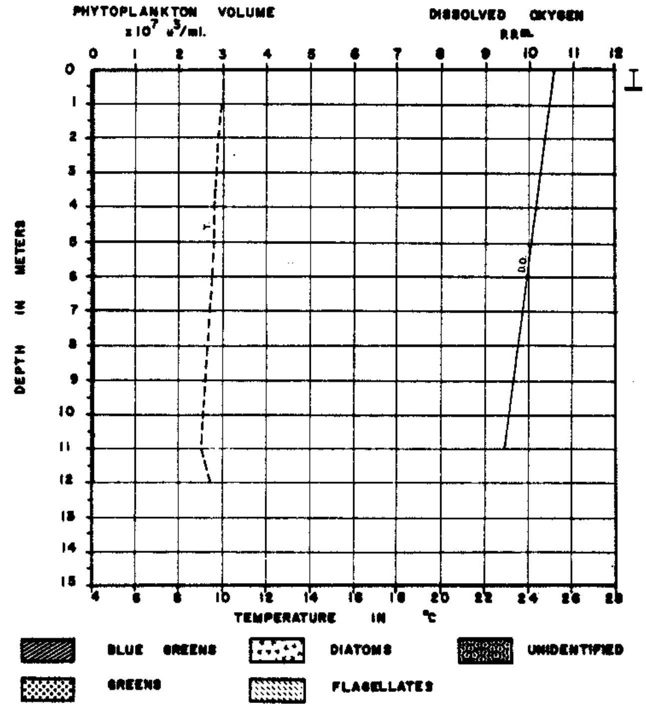


CLEAR LAKE STA. 3

DATE 2-9-70

AVG. u^3/ml. 209,219

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.11	0.11	0.4	0.03	0.64	
BOTT.	0.06	0.10	0.5	0.02	0.49	

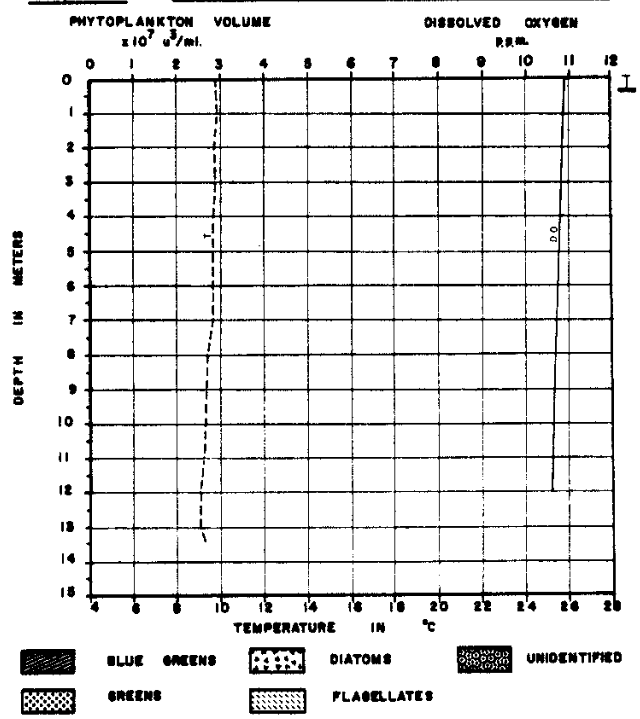


CLEAR LAKE STA. 4

DATE 2-9-70

AVG. u^3/ml. 173,783

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.07	0.11	0.4	0.00	0.37	
BOTT.	0.06	0.09	0.4	0.00	0.41	

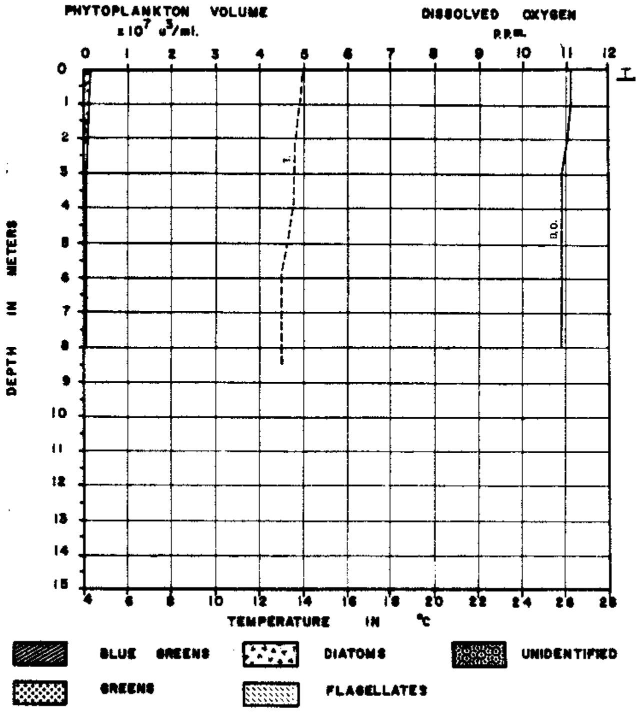


CLEAR LAKE STA. 1

DATE 3-20-70

AVG. u^3/ml.
452,103

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.07	0.10	0.5	0.00	0.29	
BOTT.	0.07	0.09	0.3	0.00	0.28	

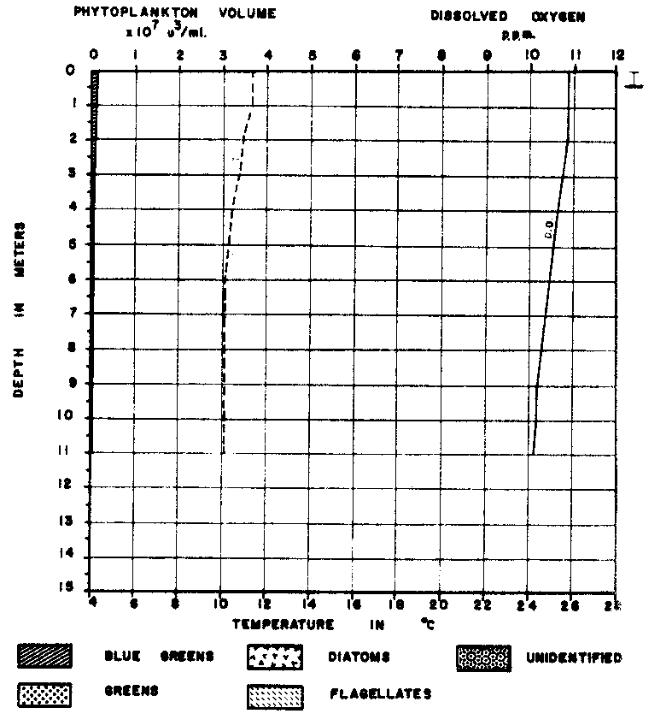


CLEAR LAKE STA. 3

DATE 3-20-70

AVG. u^3/ml.
412,942

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.07	0.07	0.4	0.00	0.44	
BOTT.	0.09	0.09	0.4	0.00	0.47	

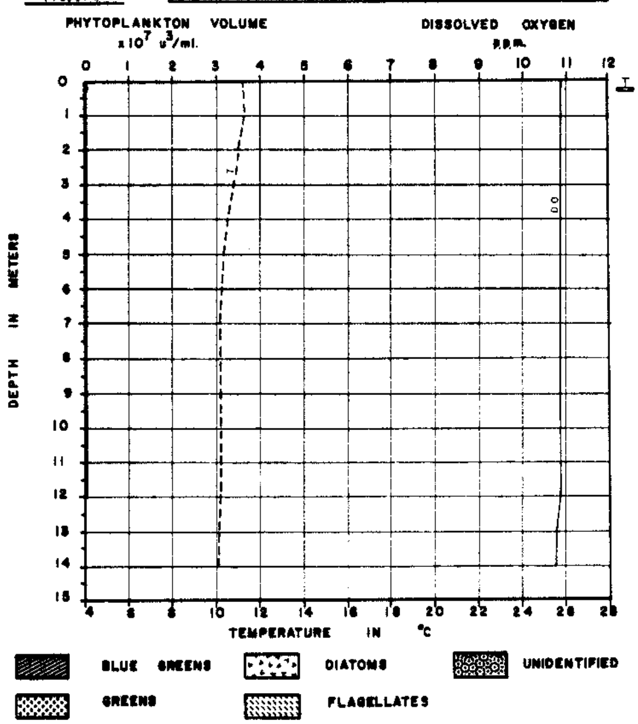


CLEAR LAKE STA. 4

DATE 3-20-70

AVG. u^3/ml.
146,375

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.08	0.4	0.00	0.43	
BOTT.	0.07	0.08	0.4	0.00	0.46	

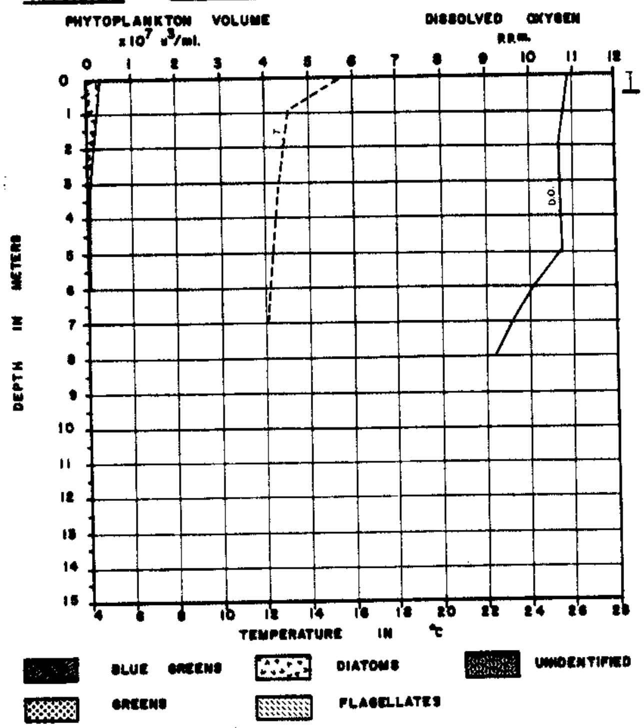


CLEAR LAKE STA. 1

DATE 4-3-70

AVG. u^3/ml. 779,216

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.10	0.4	0.00	0.21	___
BOTT.	0.06	0.09	0.3	0.00	0.26	___

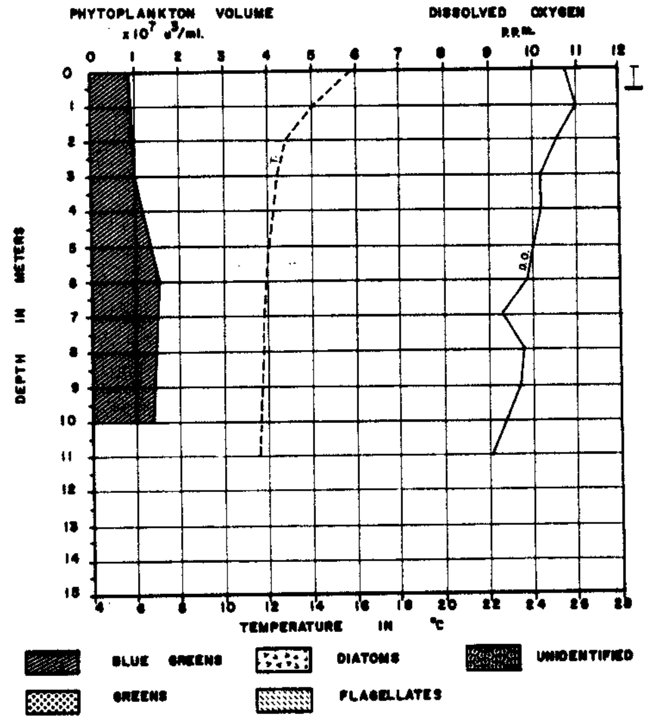


CLEAR LAKE STA. 3

DATE 4-3-70

AVG. u^3/ml. 4,276,620

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.05	0.10	0.5	0.00	0.46	___
BOTT.	0.04	0.10	0.3	0.00	0.49	___

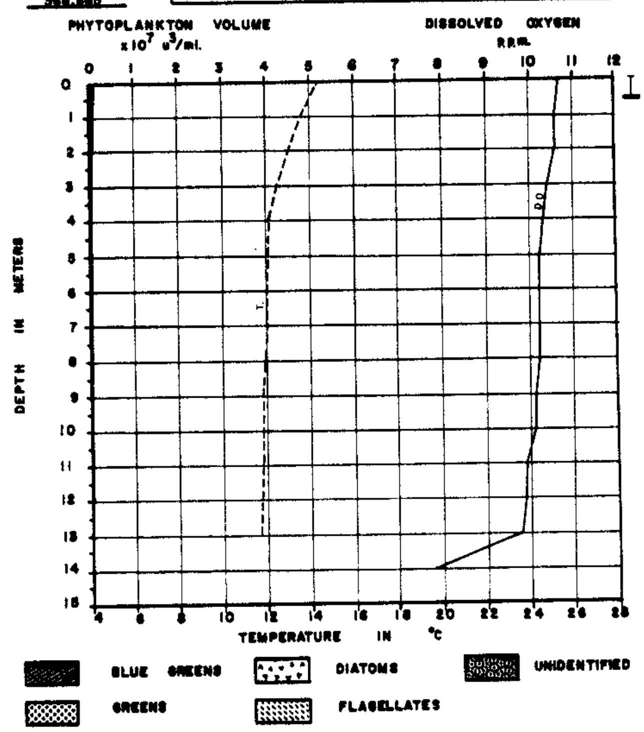


CLEAR LAKE STA. 4

DATE 4-3-70

AVG. u^3/ml. 368,865

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.09	0.3	0.00	0.44	___
BOTT.	0.06	0.09	0.3	0.00	0.47	___

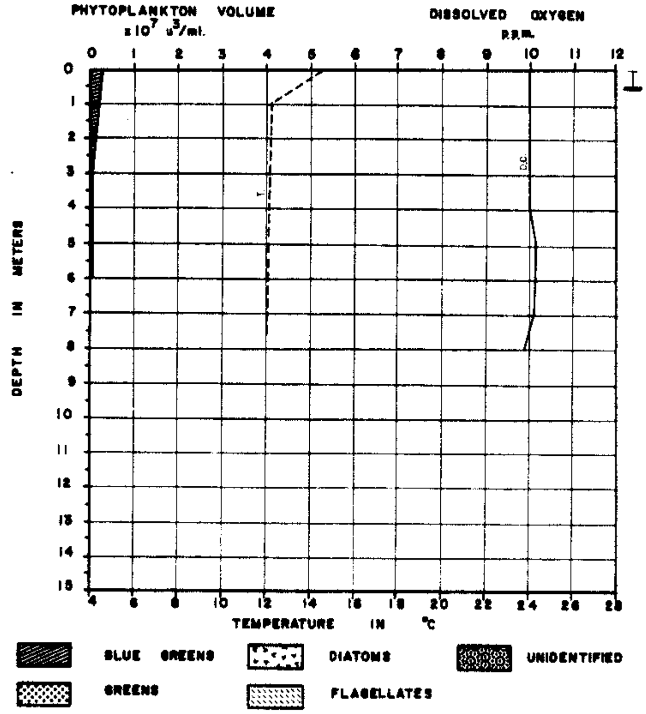


CLEAR LAKE STA. 1

DATE 4-17-70

AVG. u^3/ml. 1,094,129

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.09	0.3	0.00	0.19	
BOTT.	0.06	0.09	0.3	0.09	0.21	

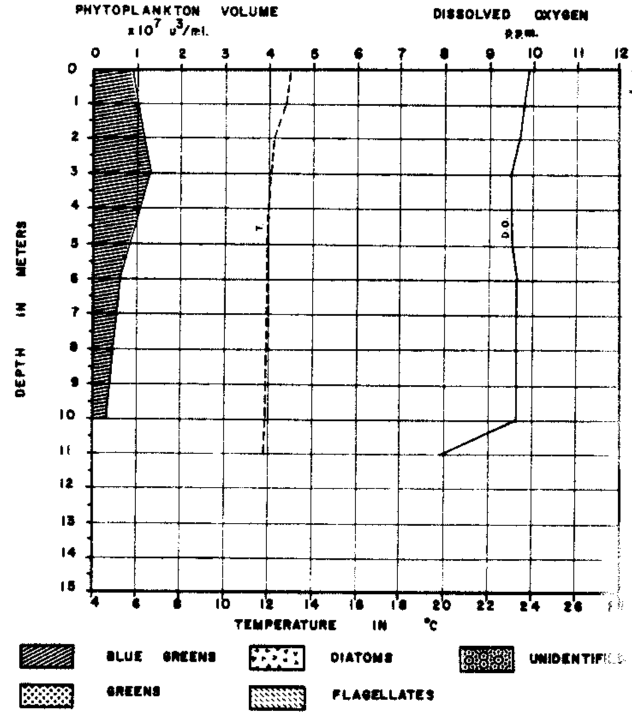


CLEAR LAKE STA. 3

DATE 4-17-70

AVG. u^3/ml. 7,815,657

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.09	0.4	0.00	0.38	
BOTT.	0.04	0.07	0.4	0.00	0.40	

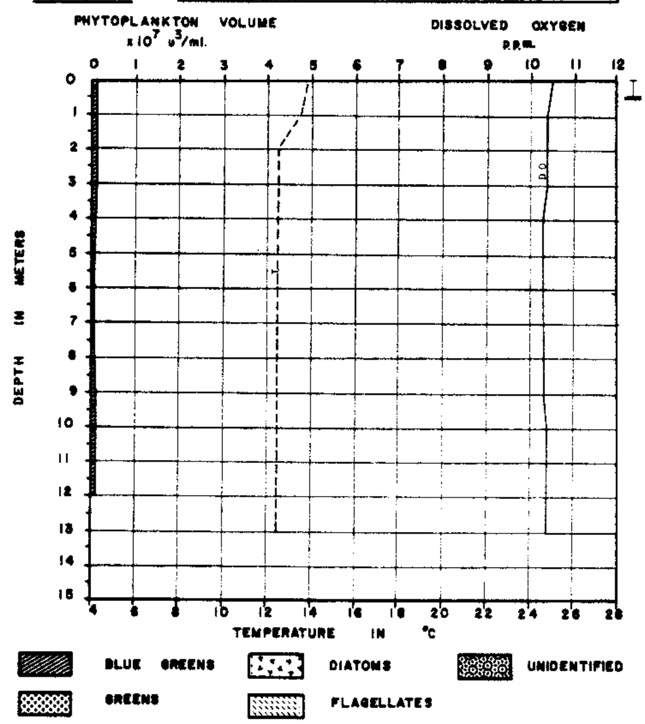


CLEAR LAKE STA. 4

DATE 4-17-70

AVG. u^3/ml. 1,262,709

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.08	0.3	0.00	0.38	
BOTT.	0.05	0.06	0.3	0.00	0.37	

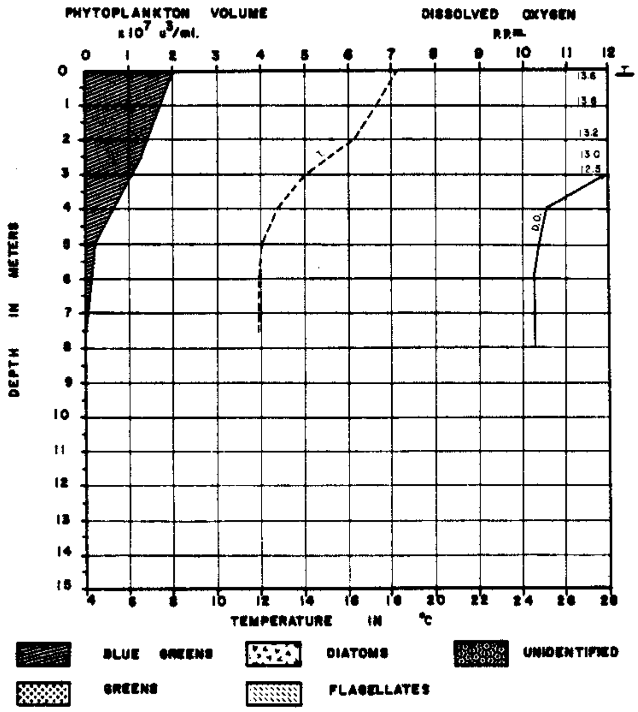


CLEAR LAKE STA. 1

DATE 6-4-70

AVG. u^3/ml. 9,343,037

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.12	0.8	0.04	0.04	___
BOTT.	0.06	0.09	0.3	0.00	0.32	___

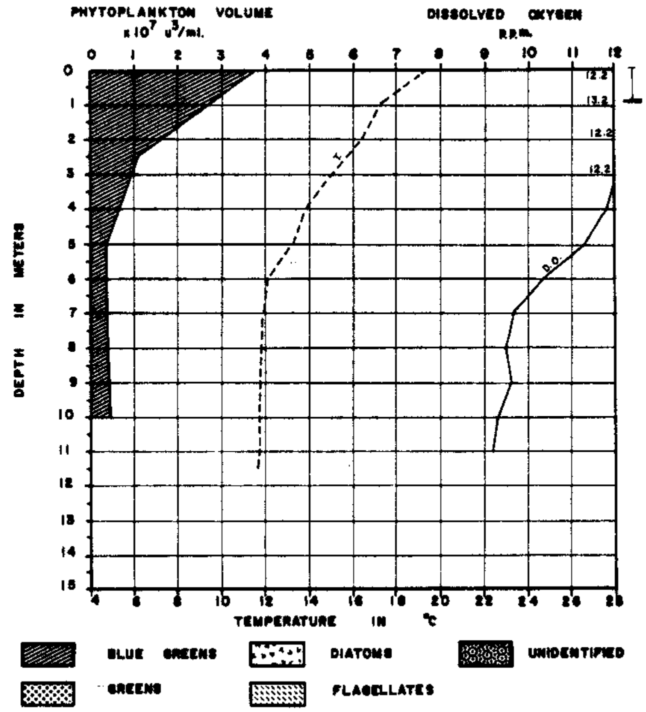


CLEAR LAKE STA. 3

DATE 6-4-70

AVG. u^3/ml. 9,609,299

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.10	1.0	0.00	0.05	___
BOTT.	0.06	0.13	0.4	0.00	0.45	___

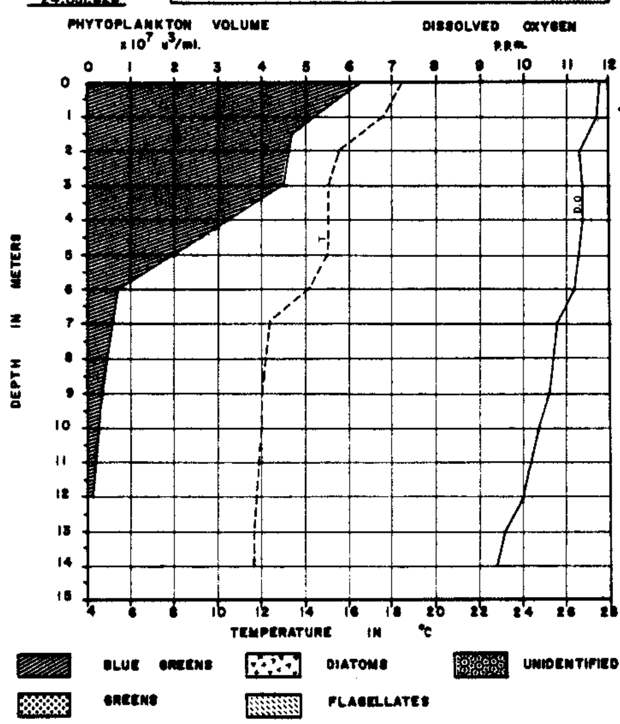


CLEAR LAKE STA. 4

DATE 6-4-70

AVG. u^3/ml. 24,051,828

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.15	0.7	0.01	0.07	___
BOTT.	0.05	0.07	0.3	0.00	0.47	___

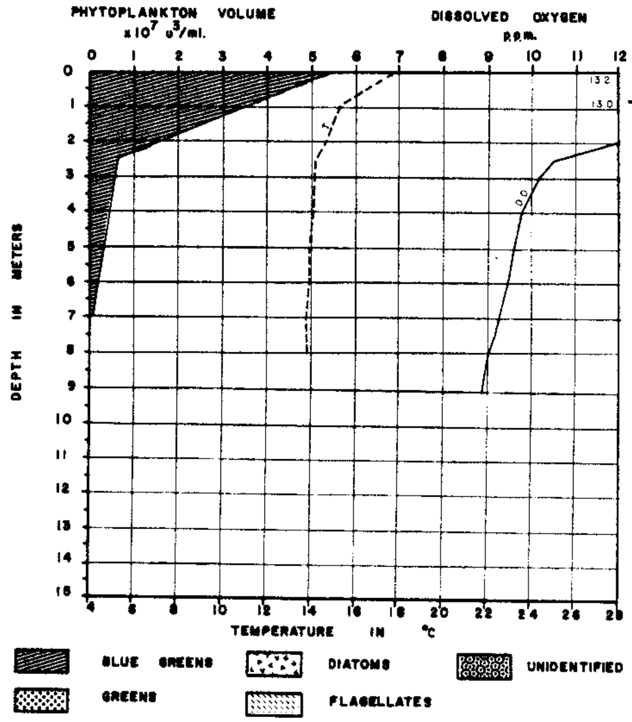


CLEAR LAKE STA. 1

DATE 5-14-70

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.21	0.9	0.01	0.00	
BOTT.	0.06	0.22	0.3	0.00	0.02	

AVG. u^3/ml.
12,463,730

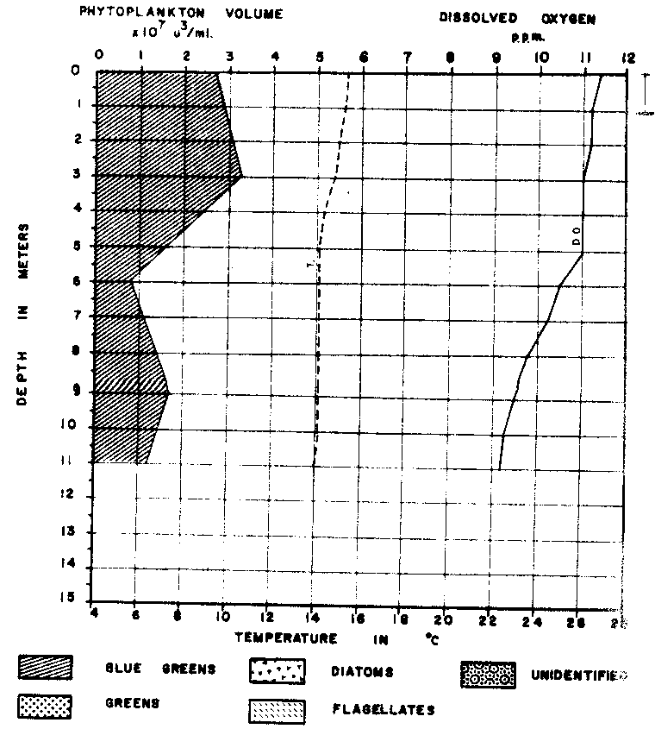


CLEAR LAKE STA. 3

DATE 5-14-70

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.14	0.8	0.01	0.00	
BOTT.	0.05	0.19	0.6	0.02	0.00	

AVG. u^3/ml
20,226,307

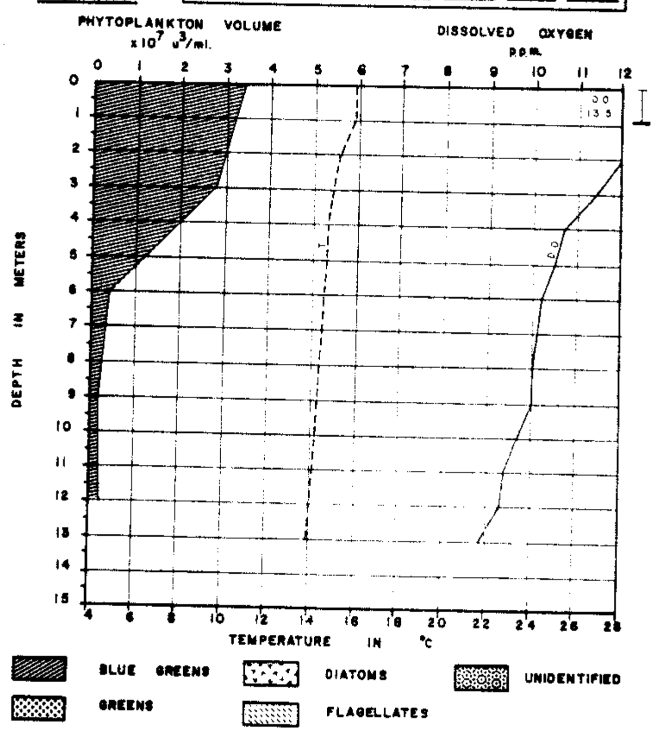


CLEAR LAKE STA. 4

DATE 5-14-70

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.09	0.9	0.00	0.00	
BOTT.	0.08	0.13	0.4	0.00	0.05	

AVG. u^3/ml.
11,675,660

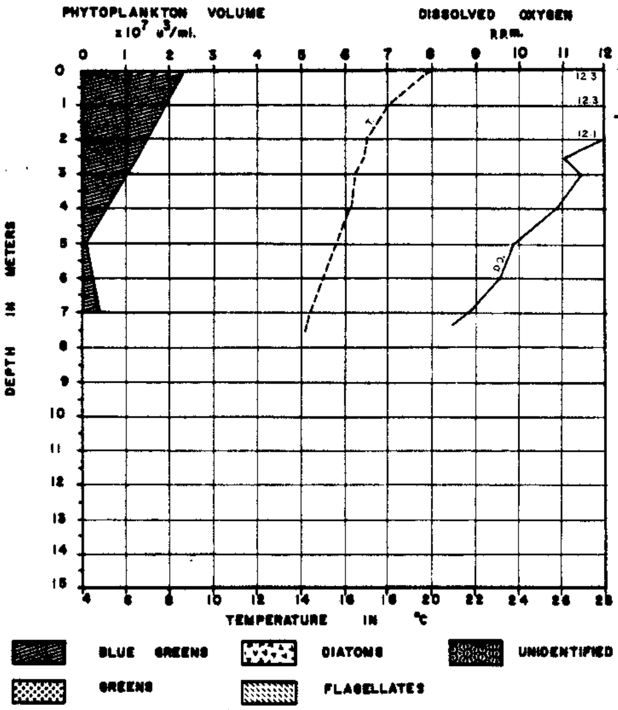


CLEAR LAKE STA. 1

DATE 5-21-70

AVG. u^3/ml. 9,294,511

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.16	0.6	0.01	0.00	___
BOTT.	0.08	0.19	0.9	0.01	0.00	___

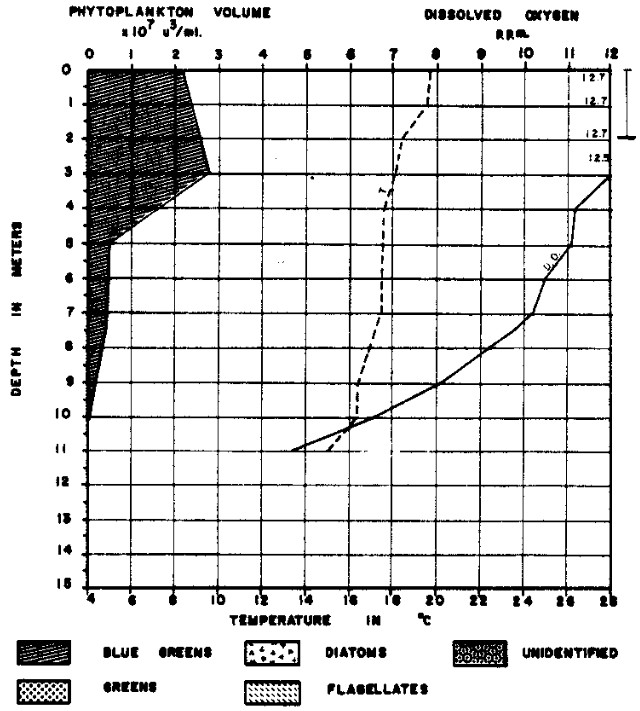


CLEAR LAKE STA. 3

DATE 5-21-70

AVG. u^3/ml. 13,671,953

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.04	0.6	0.02	0.00	___
BOTT.	0.07	0.09	0.4	0.21	0.00	___

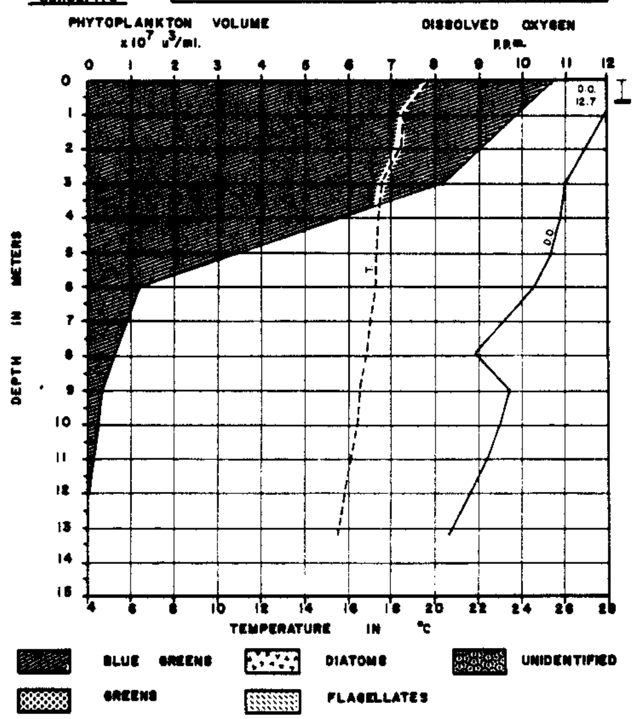


CLEAR LAKE STA. 4

DATE 5-21-70

AVG. u^3/ml. 35,192,475

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.21	1.2	0.02	0.00	___
BOTT.	0.05	0.14	0.3	0.04	0.00	___

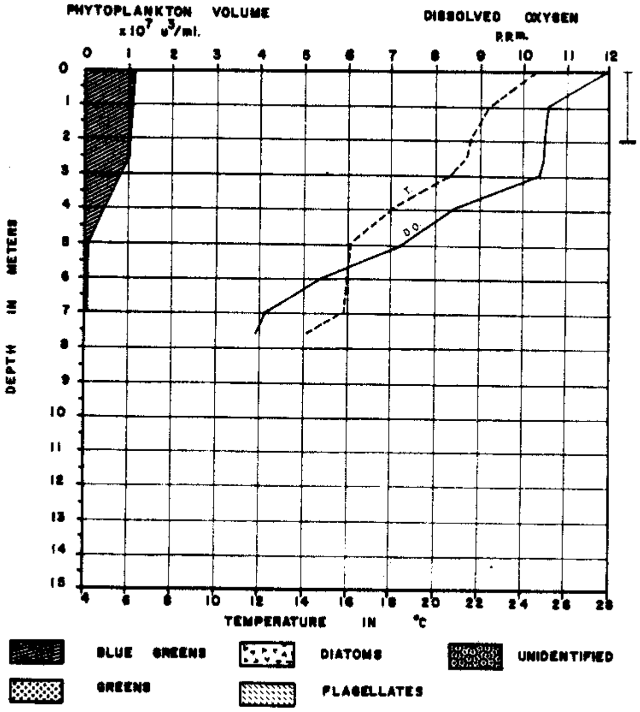


CLEAR LAKE STA. 1

DATE 6-1-70

AVG. u^3/ml. 5,917,318

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.02	0.4	0.02	0.00	
BOTT.	0.06	0.08	0.3	0.02	0.06	

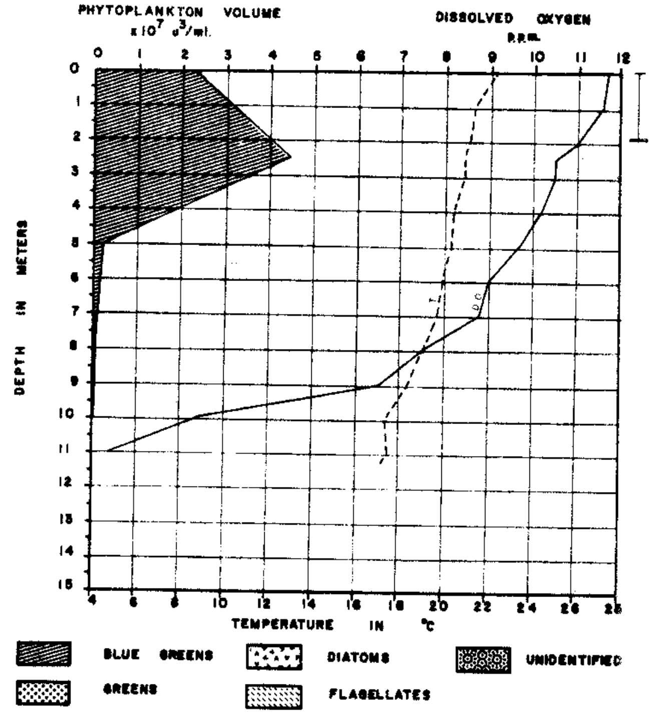


CLEAR LAKE STA. 3

DATE 6-1-70

AVG. u^3/ml. 13,441,926

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.03	0.7	0.00	0.00	
BOTT.	0.22	0.24	0.6	0.77	0.00	

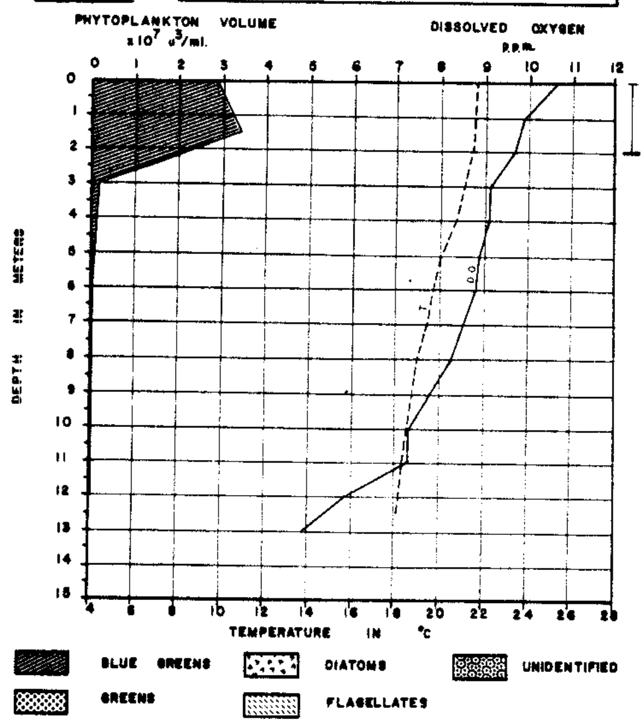


CLEAR LAKE STA. 4

DATE 6-1-70

AVG. u^3/ml. 5,942,190

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.08	0.9	0.01	0.01	
BOTT.	0.10	0.14	0.4	0.41	0.00	

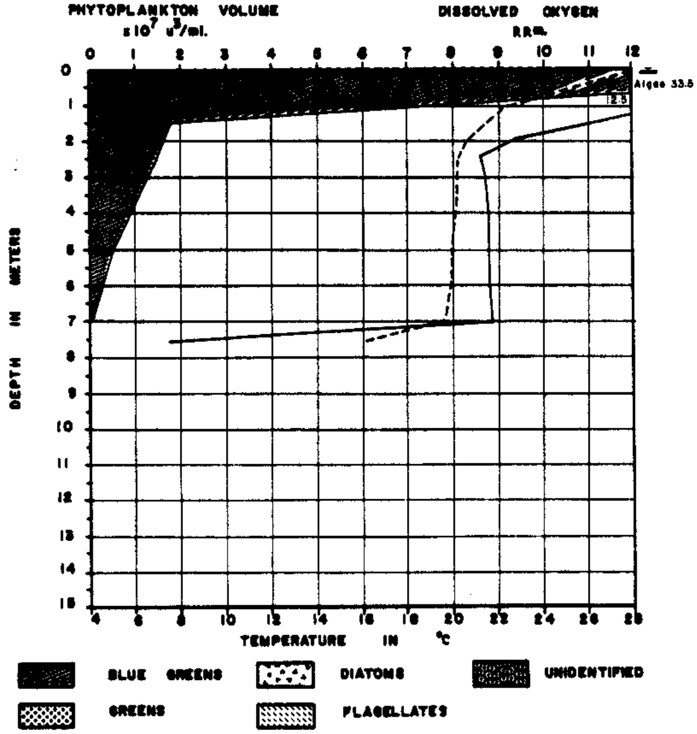


CLEAR LAKE STA. 1

DATE 6-10-70

AVG. u^3/ml.
65,687,826

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.52	4.9	0.00	0.01	
BOTT.	0.02	0.03	0.3	0.00	0.01	

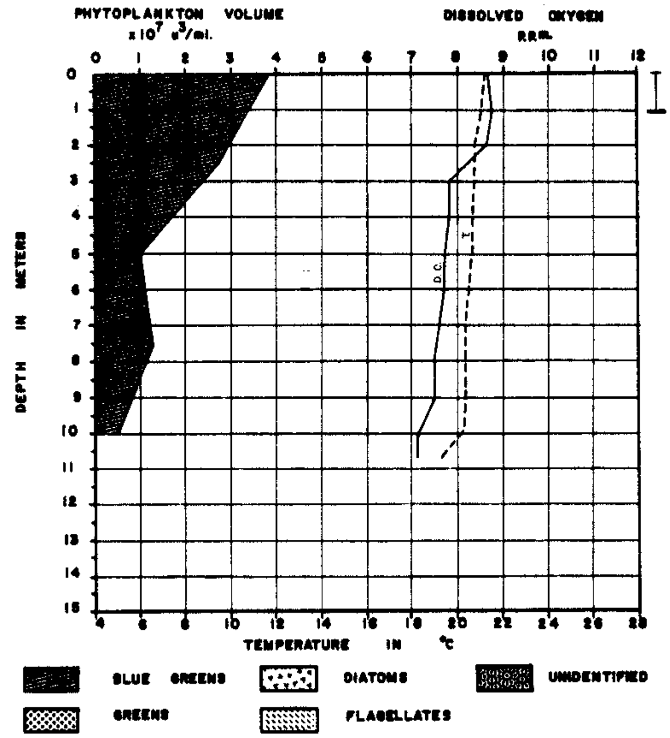


CLEAR LAKE STA. 3

DATE 6-10-70

AVG. u^3/ml.
17,602,075

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.07	0.9	0.07	0.00	
BOTT.	0.03	0.08	0.6	0.12	0.00	

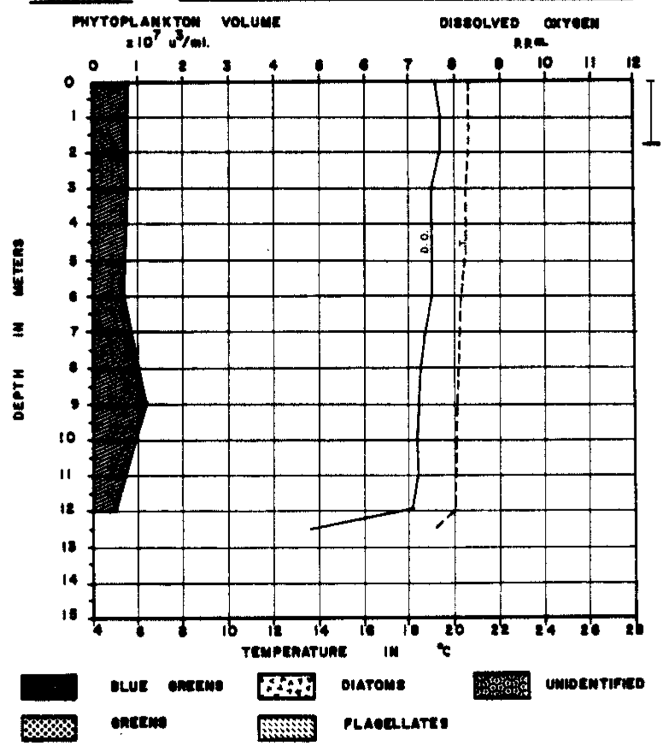


CLEAR LAKE STA. 4

DATE 6-10-70

AVG. u^3/ml.
5,827,686

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.10	0.6	0.19	0.00	
BOTT.	0.08	0.13	0.5	0.22	0.00	

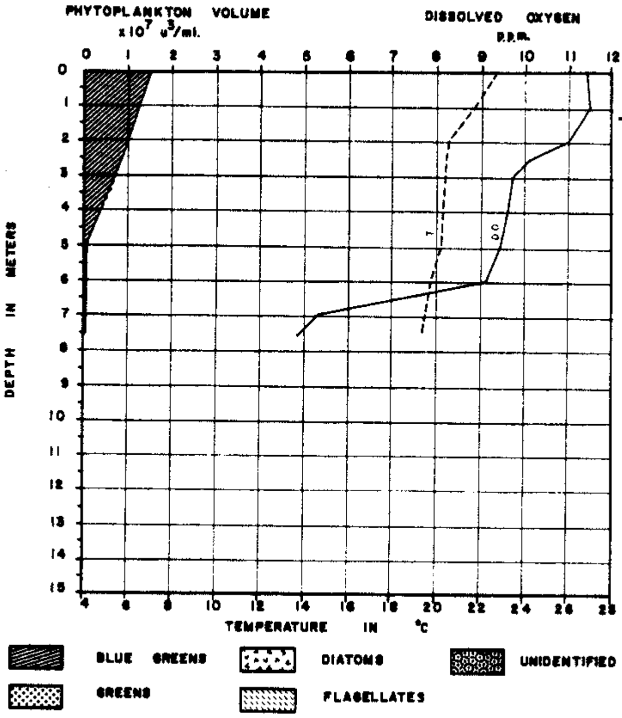


CLEAR LAKE STA. 1

DATE 6-19-70

AVG. u^3/ml. 6,120,929

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.07	0.6	0.00	0.10	
BOTT.	0.08	0.16	0.6	0.10	0.04	

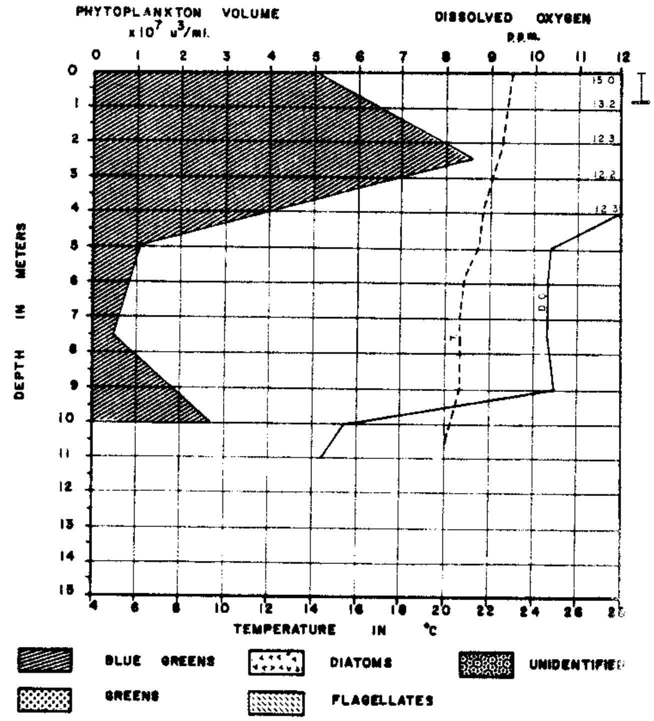


CLEAR LAKE STA. 3

DATE 6-19-70

AVG. u^3/ml. 30,827,654

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.10	1.6	0.00	0.00	
BOTT.	0.05	0.14	0.7	0.32	0.00	

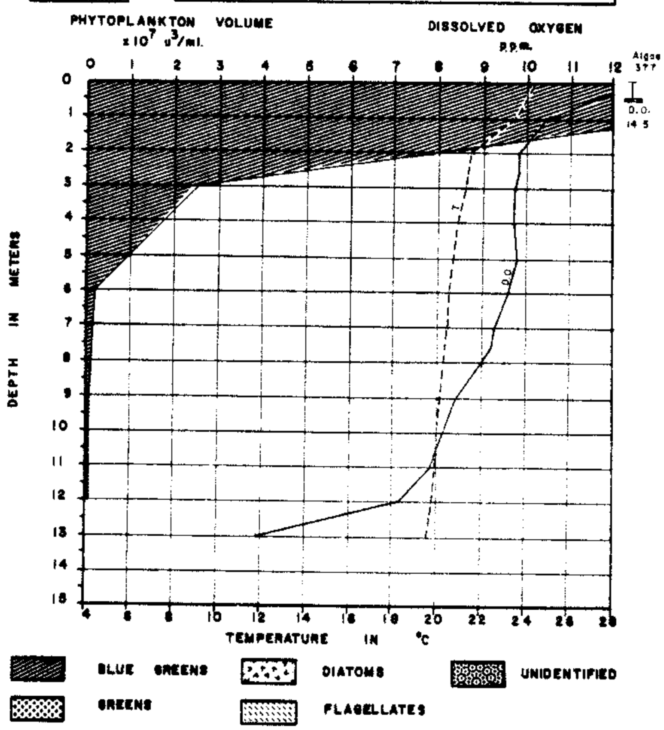


CLEAR LAKE STA. 4

DATE 6-19-70

AVG. u^3/ml. 49,710,773

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.42	4.2	0.08	0.00	
BOTT.	0.14	0.16	0.6	0.31	0.00	

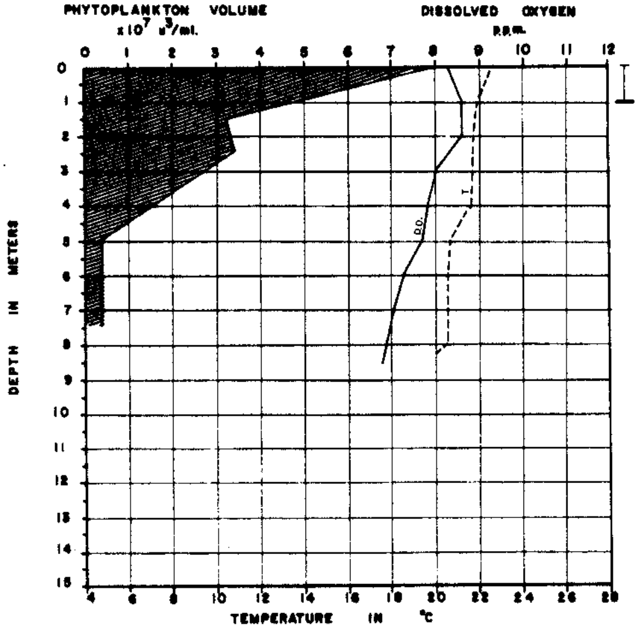


CLEAR LAKE STA. I

DATE 6-29-70

AVG. u^3/ml. 34,387,913

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.17	1.3	0.00	0.01	___
BOTT.	0.09	0.11	0.4	0.00	0.09	___



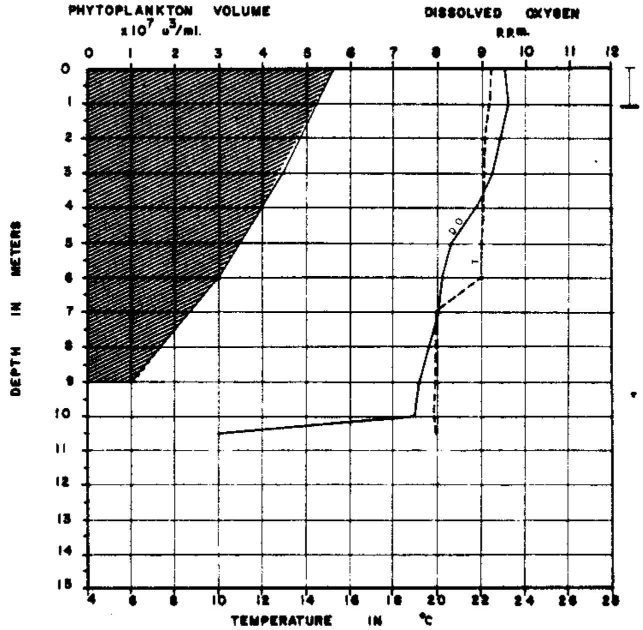
BLUE GREENS — DIATOMS — UNIDENTIFIED — GREENS — FLAGELLATES

CLEAR LAKE STA. 3

DATE 6-29-70

AVG. u^3/ml. 32,255,137

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.10	1.1	0.00	0.00	___
BOTT.	0.02	0.09	0.7	0.11	0.00	___



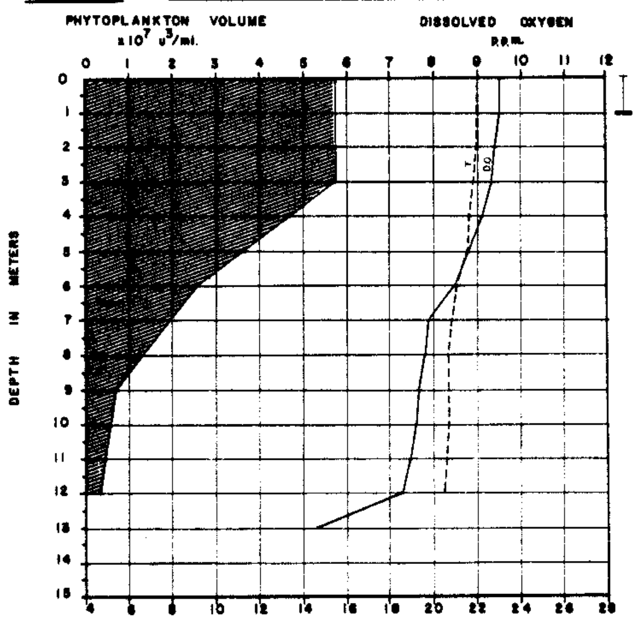
BLUE GREENS — DIATOMS — UNIDENTIFIED — GREENS — FLAGELLATES

CLEAR LAKE STA. 4

DATE 6-29-70

AVG. u^3/ml. 41,109,476

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.05	0.14	1.2	0.01	0.02	___
BOTT.	0.09	0.13	0.4	0.17	0.00	___



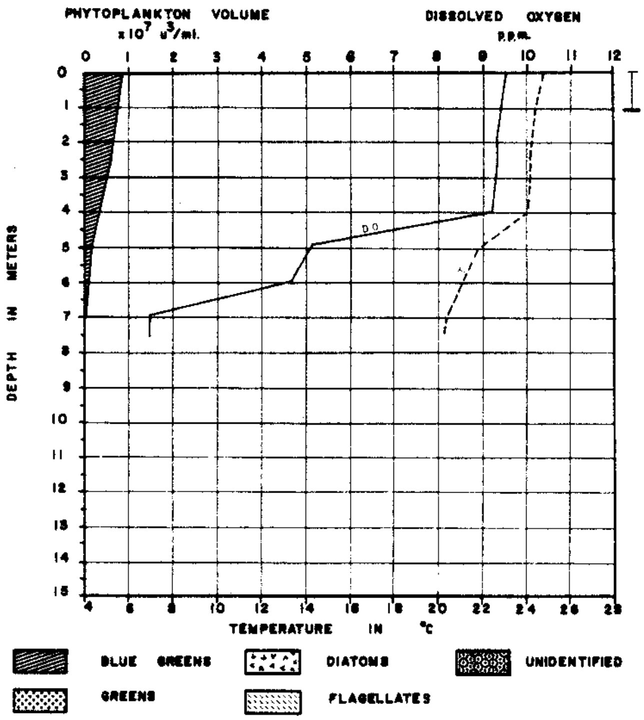
BLUE GREENS — DIATOMS — UNIDENTIFIED — GREENS — FLAGELLATES

CLEAR LAKE STA. 1

DATE 7-8-70

AVG. u^3/ml. 7,687,278

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.11	0.5	0.01	0.02	
BOTT.	0.13	0.19	0.4	0.14	0.10	

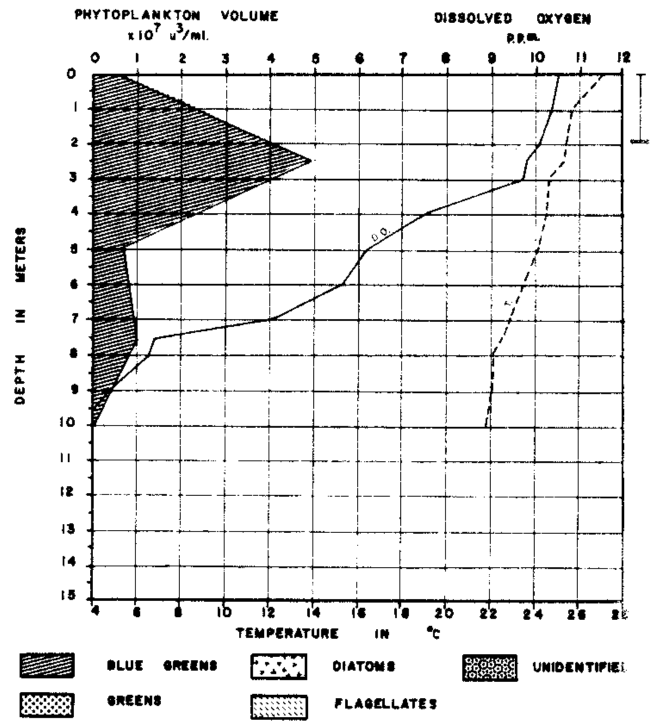


CLEAR LAKE STA. 3

DATE 7-8-70

AVG. u^3/ml. 15,377,882

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.10	0.8	0.06	0.02	
BOTT.	0.01	0.50	0.6	1.40	0.02	

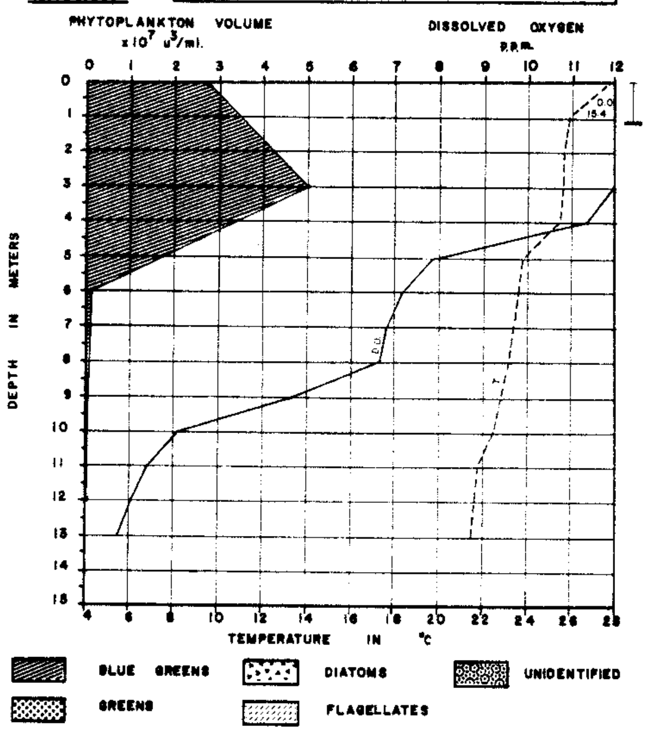


CLEAR LAKE STA. 4

DATE 7-8-70

AVG. u^3/ml. 15,400,636

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.08	0.6	0.00	0.02	
BOTT.	0.29	0.31	0.5	0.29	0.02	

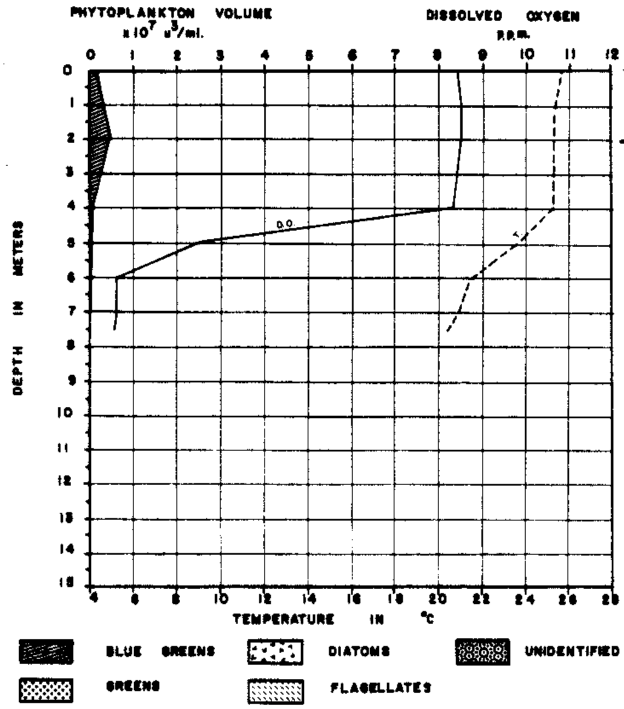


CLEAR LAKE STA. 1

DATE 7-17-70

AVG. u^3/ml. 2,448,884

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.08	0.12	0.6	0.04	0.01	
BOTT.	0.11	0.39	0.6	0.26	0.01	

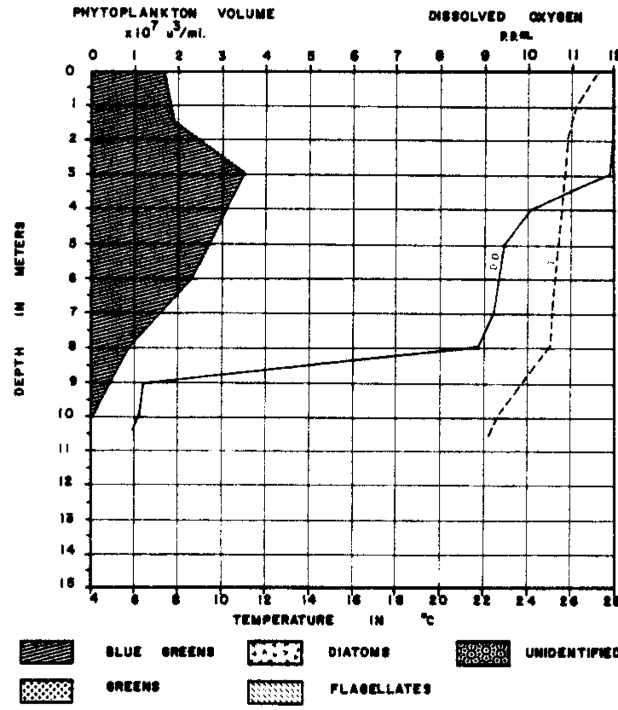


CLEAR LAKE STA. 3

DATE 7-17-70

AVG. u^3/ml. 17,395,718

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.08	0.8	0.00	0.01	
BOTT.	0.00	0.07	0.8	0.09	0.01	

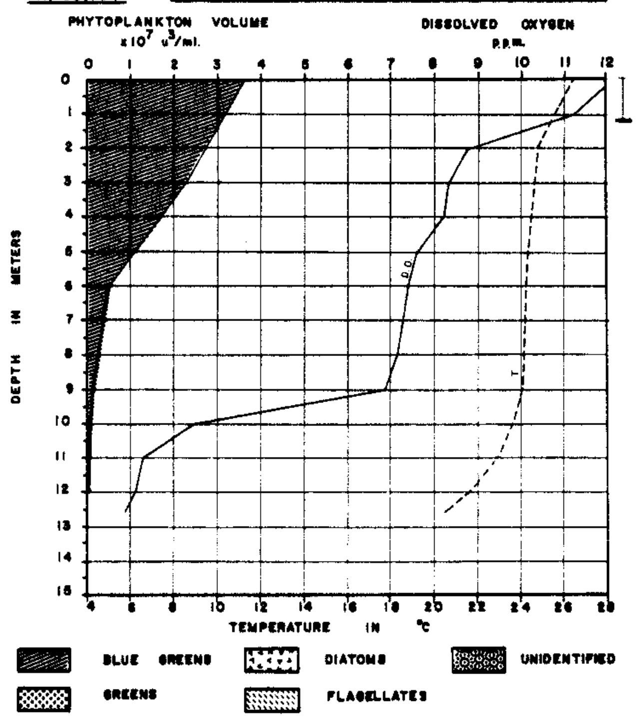


CLEAR LAKE STA. 4

DATE 7-17-70

AVG. u^3/ml. 11,782,734

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.11	0.9	0.00	0.02	
BOTT.	0.45	0.52	0.4	0.94	0.01	

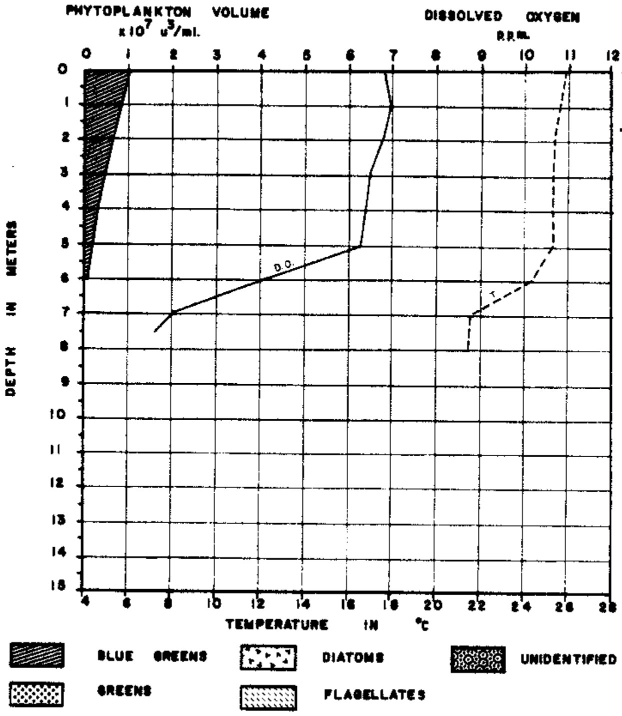


CLEAR LAKE STA. 1

DATE 7-28-70

AVG. u^3/ml. 4,678,180

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.21	0.26	0.8	0.09	0.02	
BOTT.	0.22	0.31	0.6	0.13	0.02	

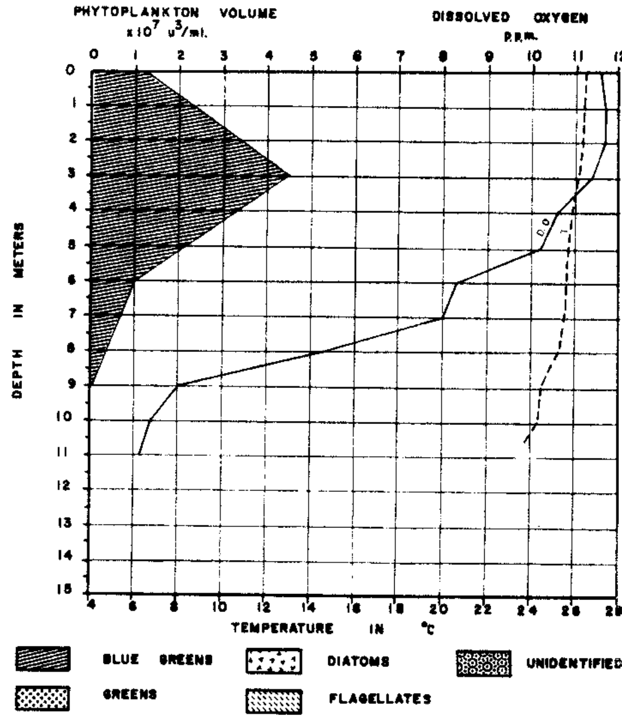


CLEAR LAKE STA. 3

DATE 7-28-70

AVG. u^3/ml. 17,796,135

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.10	1.1	0.00	0.02	
BOTT.	0.10	0.16	0.6	0.36	0.02	

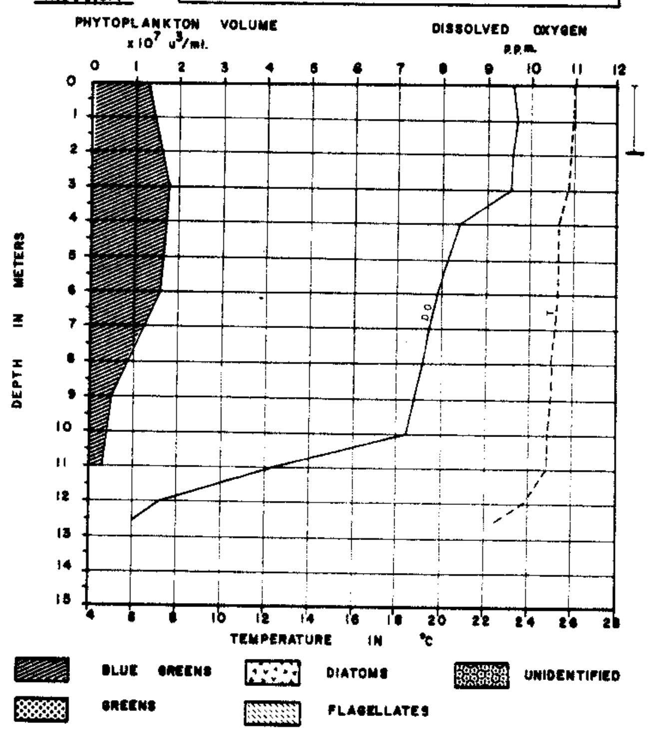


CLEAR LAKE STA. 4

DATE 7-28-70

AVG. u^3/ml. 11,808,514

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.09	0.17	0.7	0.00	0.02	
BOTT.	0.15	0.19	0.8	0.17	0.01	

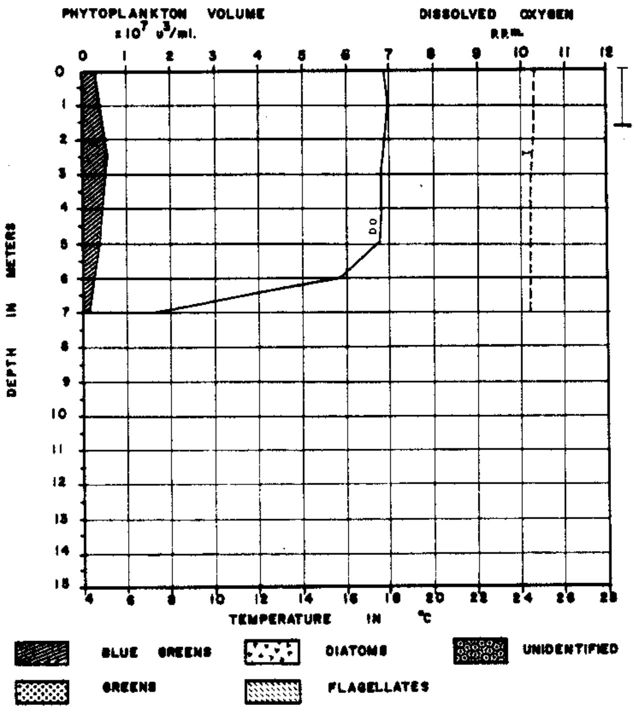


CLEAR LAKE STA. 1

DATE 8-6-70

AVG. u^3/ml. 4,585,918

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.26	0.32	0.6	0.00	0.02	
BOTT.	0.35	0.35	0.6	0.09	0.02	

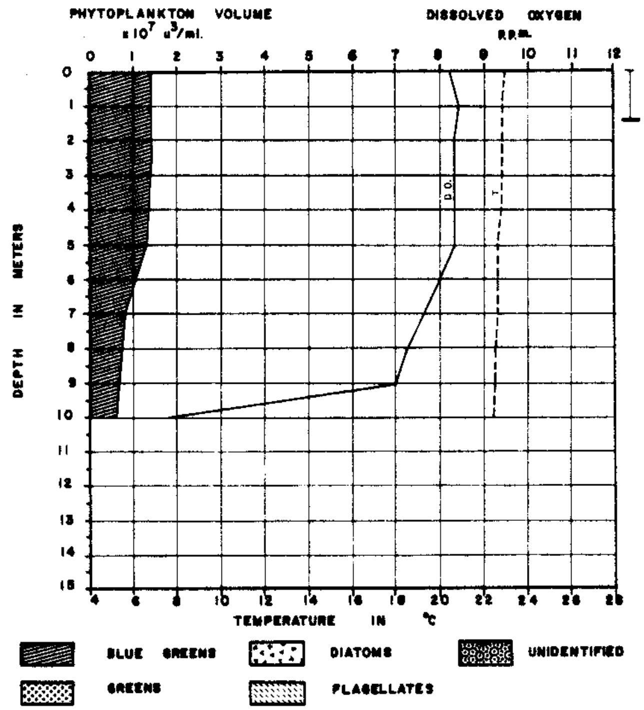


CLEAR LAKE STA. 3

DATE 8-6-70

AVG. u^3/ml. 11,905,628

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.13	0.9	0.00	0.01	
BOTT.	0.07	0.14	0.7	0.00	0.02	

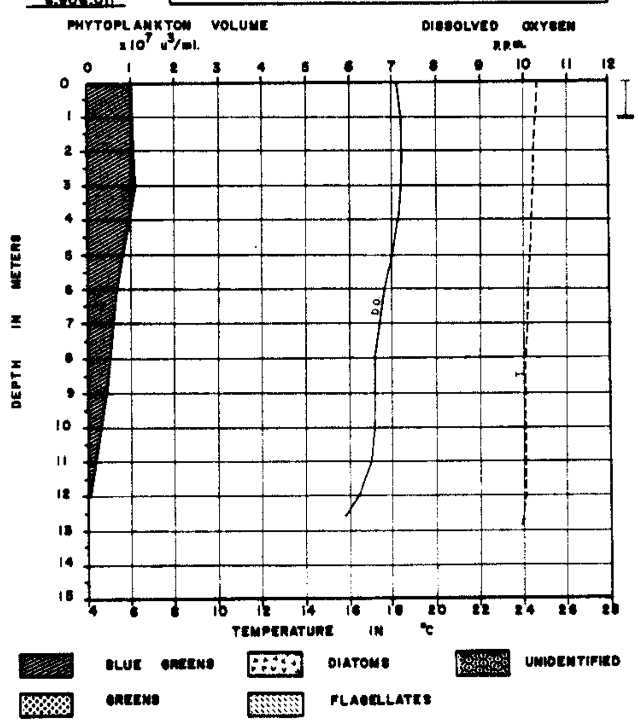


CLEAR LAKE STA. 4

DATE 8-6-70

AVG. u^3/ml. 6,906,011

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.16	0.33	0.8	0.13	0.02	
BOTT.	0.16	0.20	0.6	0.21	0.02	

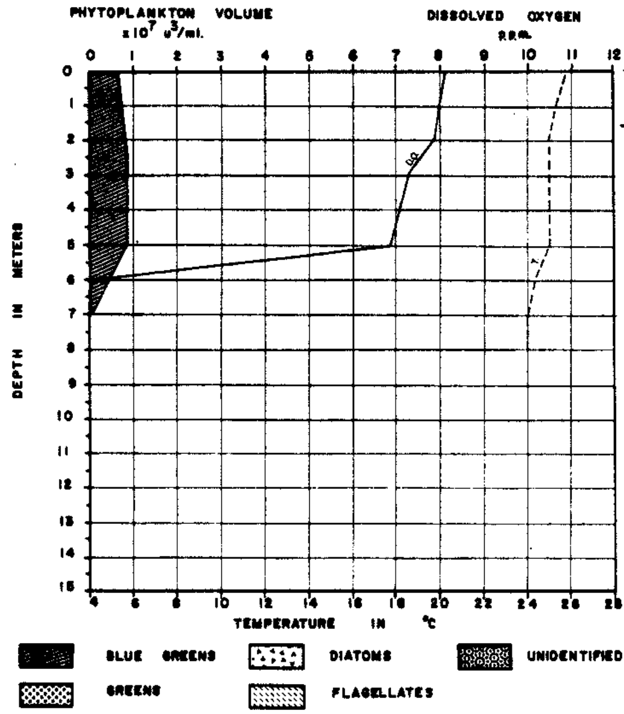


CLEAR LAKE STA. I

DATE 8-17-70

AVG. u^3/ml. 7,941,651

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.30	0.35	0.7	0.00	0.01	
BOTT.	0.60	0.60	0.8	0.19	0.01	

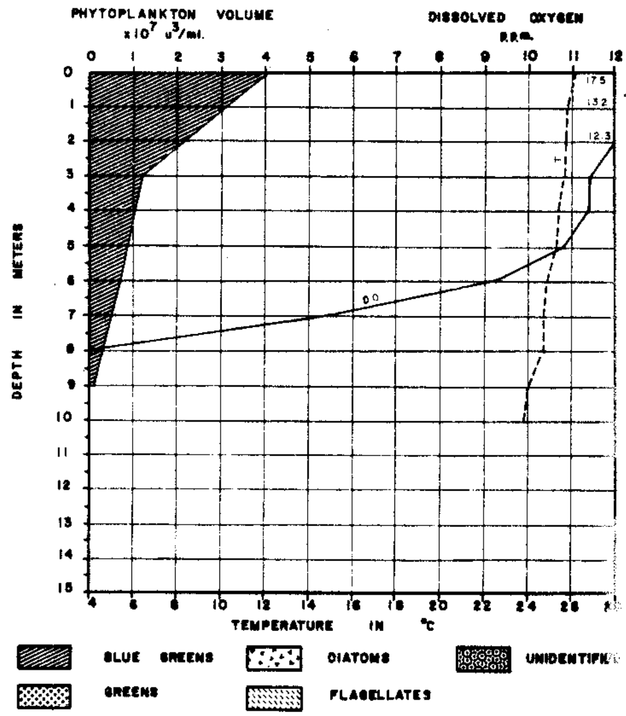


CLEAR LAKE STA. 3

DATE 8-17-70

AVG. u^3/ml. 13,762,209

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.25	2.8	0.00	0.00	
BOTT.	0.13	0.27	0.6	0.34	0.00	

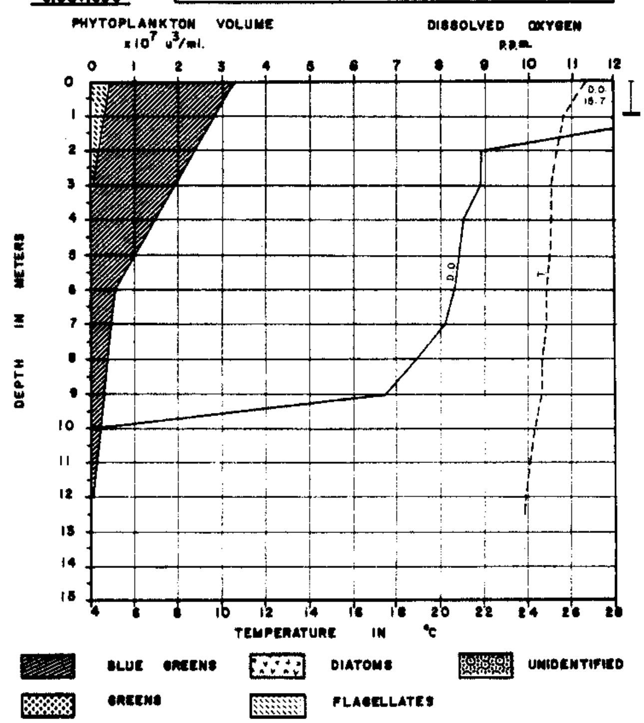


CLEAR LAKE STA. 4

DATE 8-18-70

AVG. u^3/ml. 8,921,856

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.12	0.26	1.6	0.00	0.01	
BOTT.	0.27	0.41	0.6	0.60	0.00	

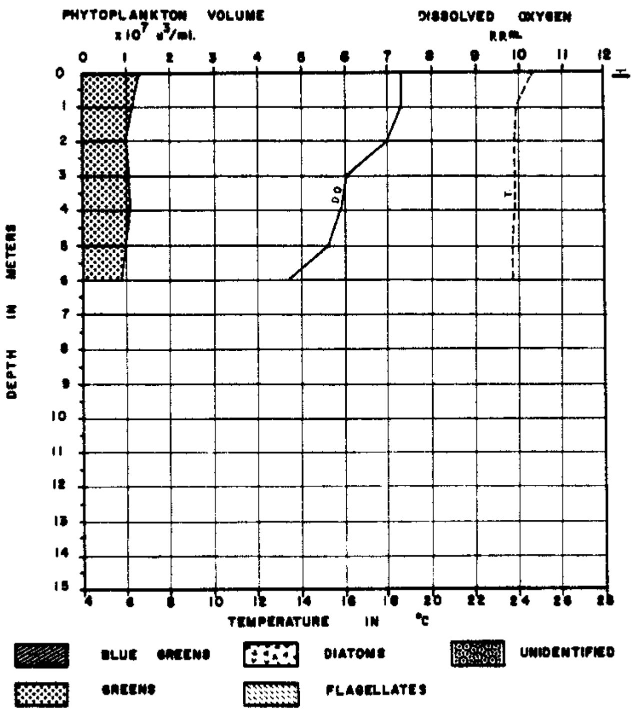


CLEAR LAKE STA. 1

DATE 8-26-70

AVG. u^3/ml. 11,114,771

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.38	0.39	0.7	0.00	0.01	
BOTT.	0.37	0.39	0.6	0.00	0.03	

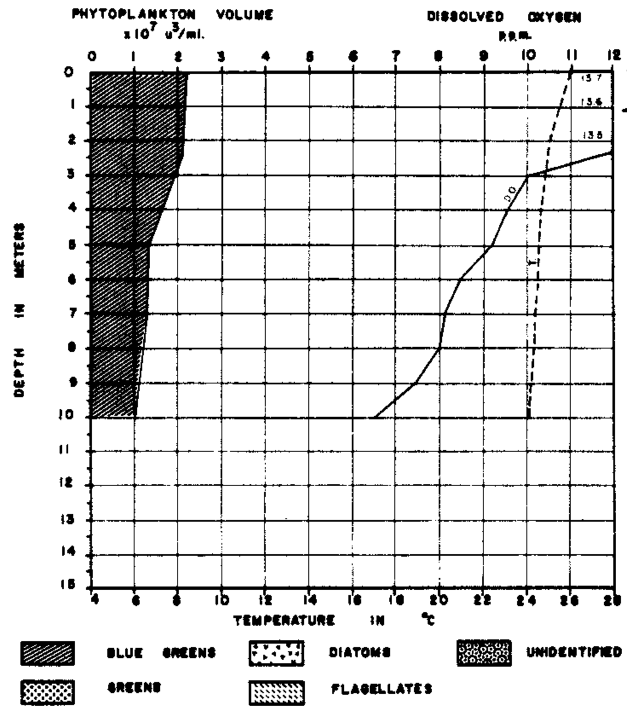


CLEAR LAKE STA. 3

DATE 8-26-70

AVG. u^3/ml. 16,166,222

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.05	0.16	1.8	0.00	0.03	
BOTT.	0.09	0.12	0.8	0.14	0.03	

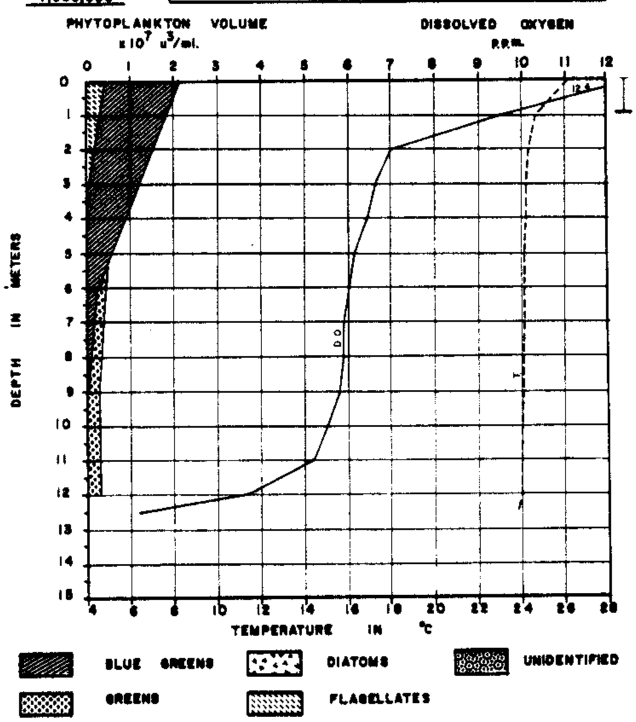


CLEAR LAKE STA. 4

DATE 8-26-70

AVG. u^3/ml. 7,836,953

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.15	0.26	1.3	0.00	0.02	
BOTT.	0.20	0.24	0.6	0.20	0.03	

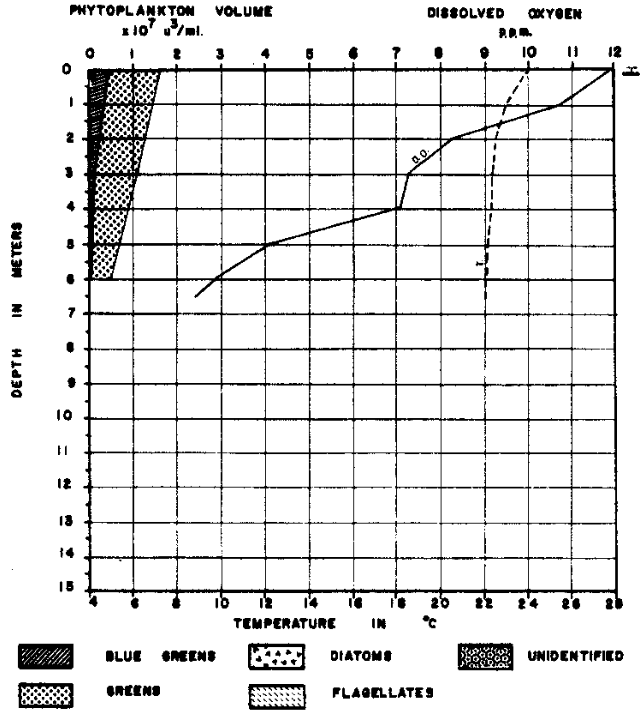


CLEAR LAKE STA. I

DATE 9-8-70

AVG. u^3/ml. 10,898,529

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.31	0.38	0.9	0.00	0.01	
BOTT.	0.40	0.45	0.9	0.04	0.00	

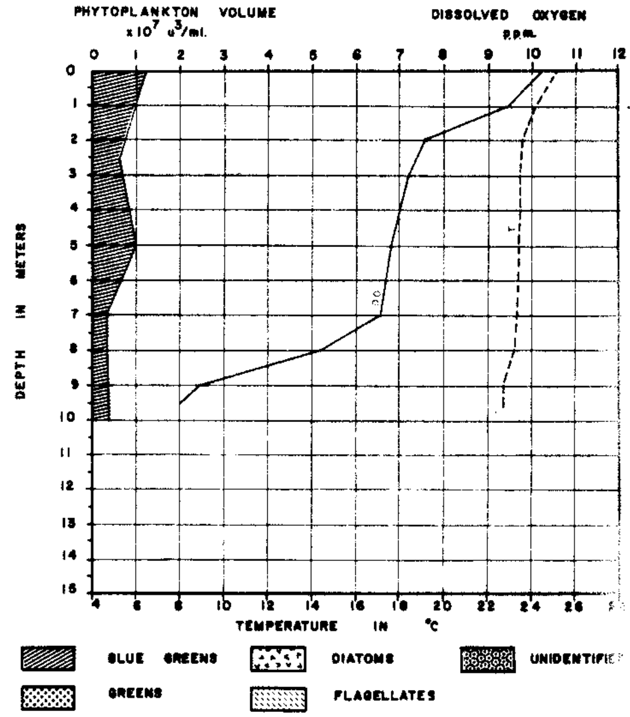


CLEAR LAKE STA. 3

DATE 9-8-70

AVG. u^3/ml. 6,882,157

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.14	1.4	0.01	0.00	
BOTT.	0.03	0.10	0.7	0.44	0.01	

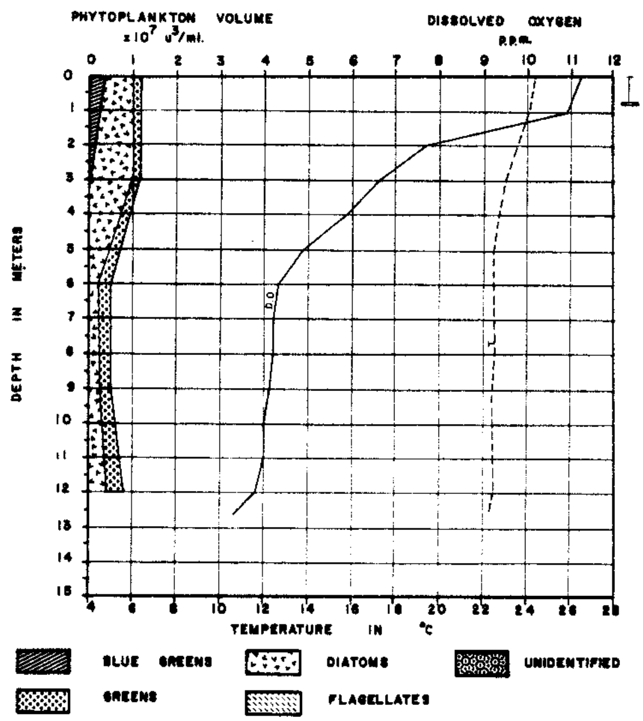


CLEAR LAKE STA. 4

DATE 9-8-70

AVG. u^3/ml. 8,326,610

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.14	0.18	1.0	0.00	0.02	
BOTT.	0.18	0.28	0.8	0.02	0.14	

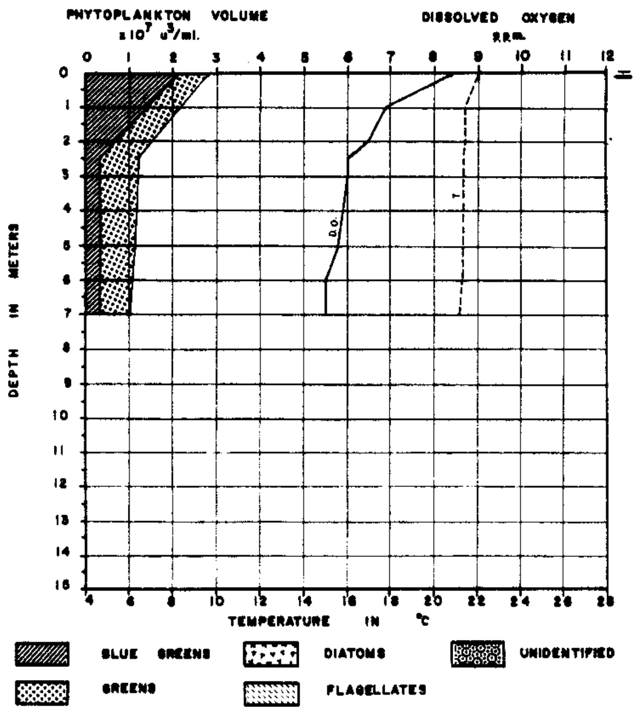


CLEAR LAKE STA. 1

DATE 9-17-70

AVG. u^3/ml. 14,357,948

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.37	0.48	1.1	0.01	0.02	
BOTT.	0.23	1.20	0.7	0.01	0.02	

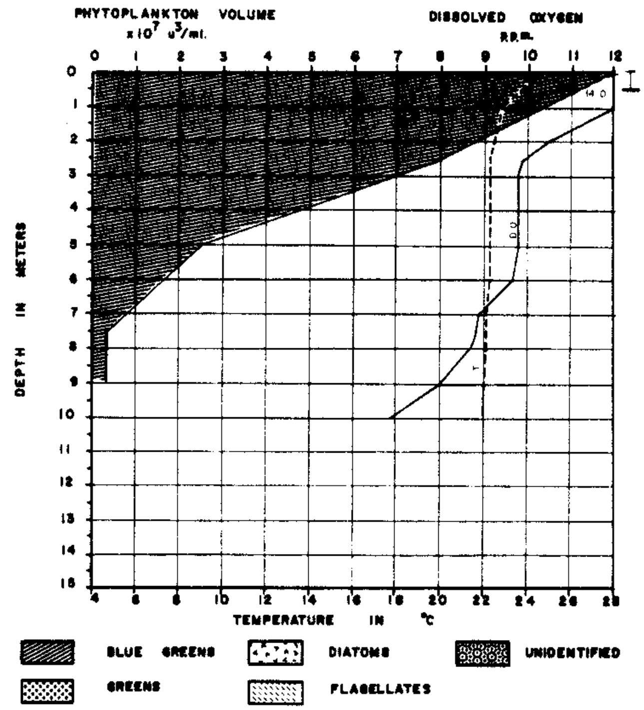


CLEAR LAKE STA. 3

DATE 9-17-70

AVG. u^3/ml. 27,518,977

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.54	6.6	0.81	0.02	
BOTT.	0.02	0.10	0.8	0.25	0.04	

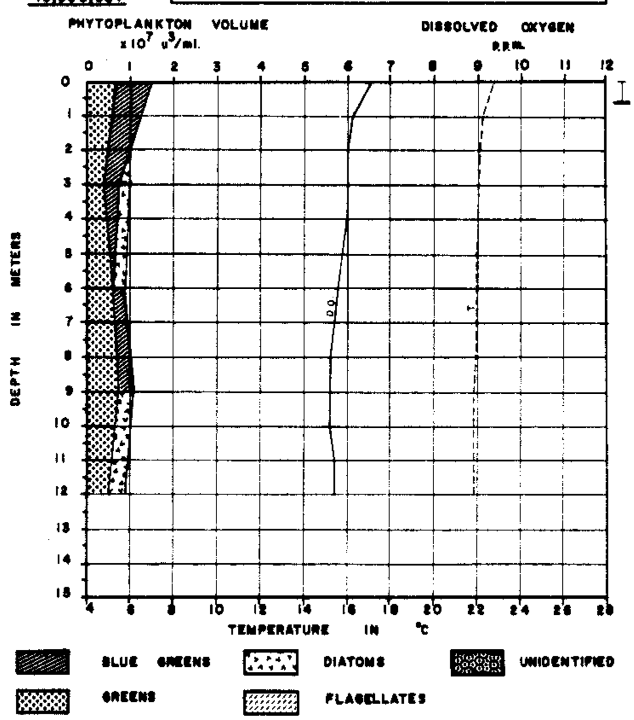


CLEAR LAKE STA. 4

DATE 9-17-70

AVG. u^3/ml. 10,998,324

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.13	0.26	1.0	0.02	0.13	
BOTT.	0.10	0.28	0.8	0.03	0.15	

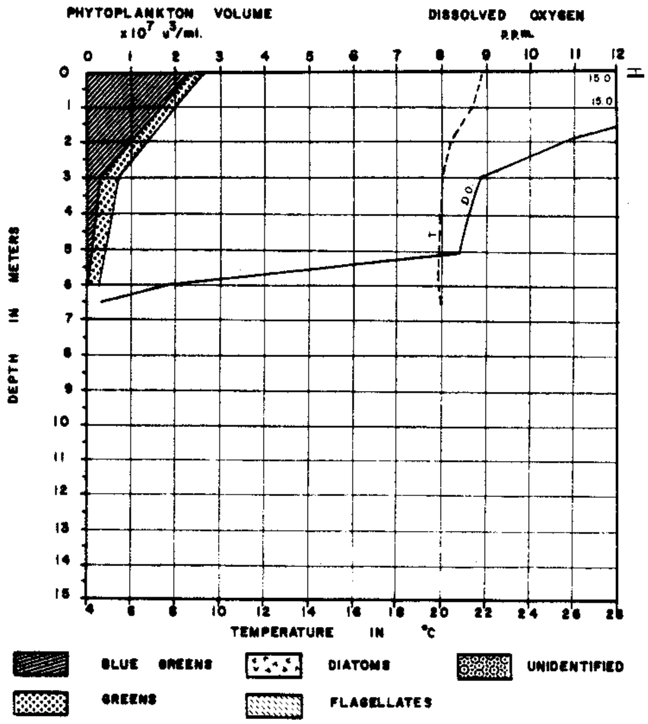


CLEAR LAKE STA. 1

DATE 9-29-70

AVG. u^3/ml.
11,488,113

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.24	0.44	1.1	0.17	0.01	
BOTT.	0.30	0.41	0.8	0.17	0.07	

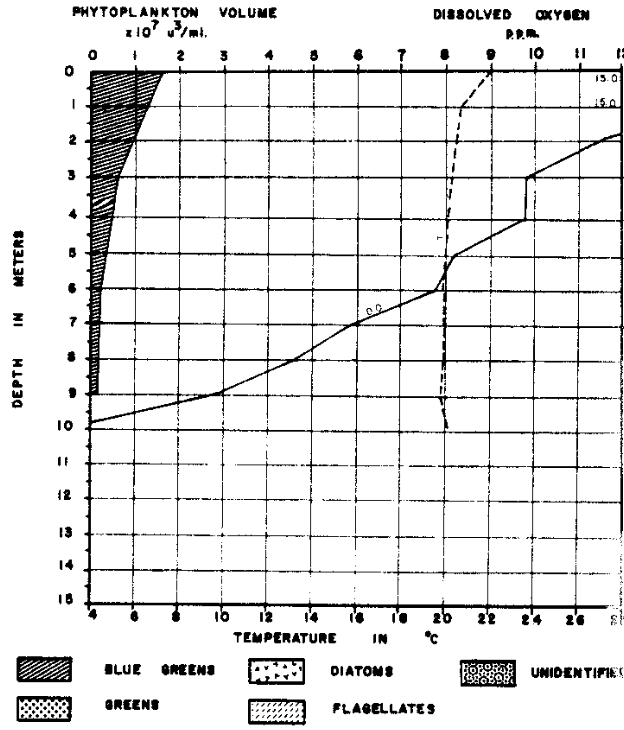


CLEAR LAKE STA. 3

DATE 9-29-70

AVG. u^3/ml.
5,969,063

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.15	0.55	1.8	1.17	0.03	
BOTT.	0.02	0.10	0.7	0.55	0.10	

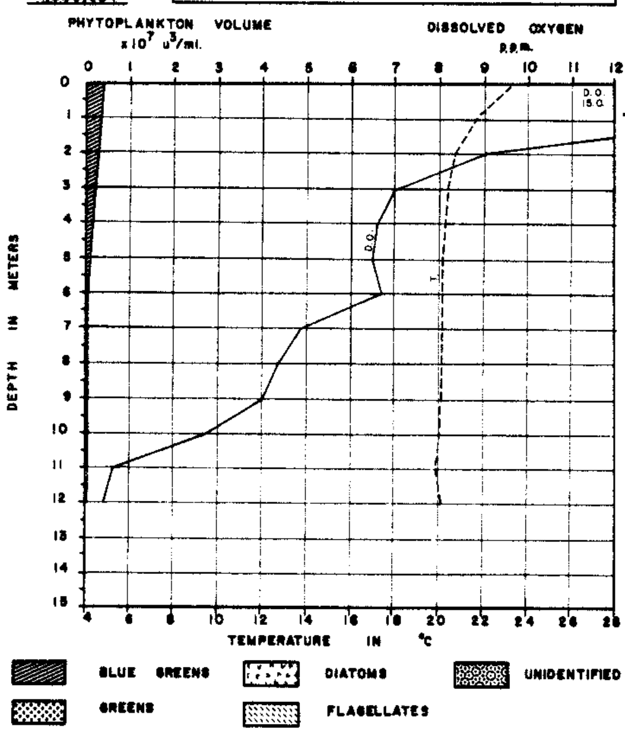


CLEAR LAKE STA. 4

DATE 9-29-70

AVG. u^3/ml.
1,529,624

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.12	0.40	1.4	0.27	0.12	
BOTT.	0.05	0.23	0.7	0.37	0.26	

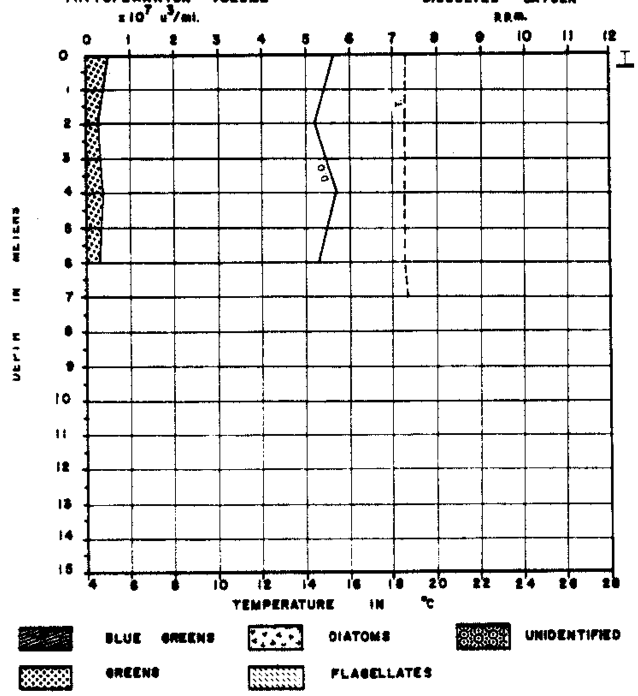


CLEAR LAKE STA. 1

DATE 10-16-70

AVG. u^3/ml. 3,942,287

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.36	0.39	0.6	0.00	0.29	
BOTT.	0.12	0.41	0.6	0.01	0.26	

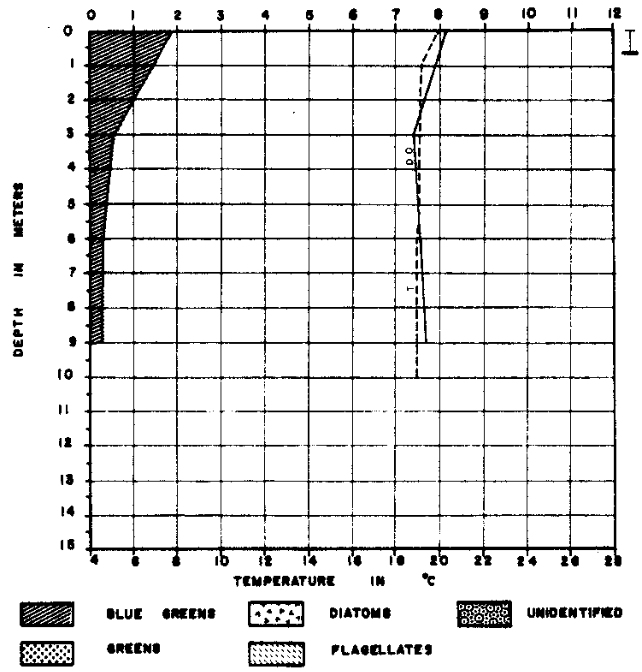


CLEAR LAKE STA. 3

DATE 10-16-70

AVG. u^3/ml. 6,961,726

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.12	0.9	0.09	0.05	
BOTT.	0.02	0.09	0.7	0.09	0.05	

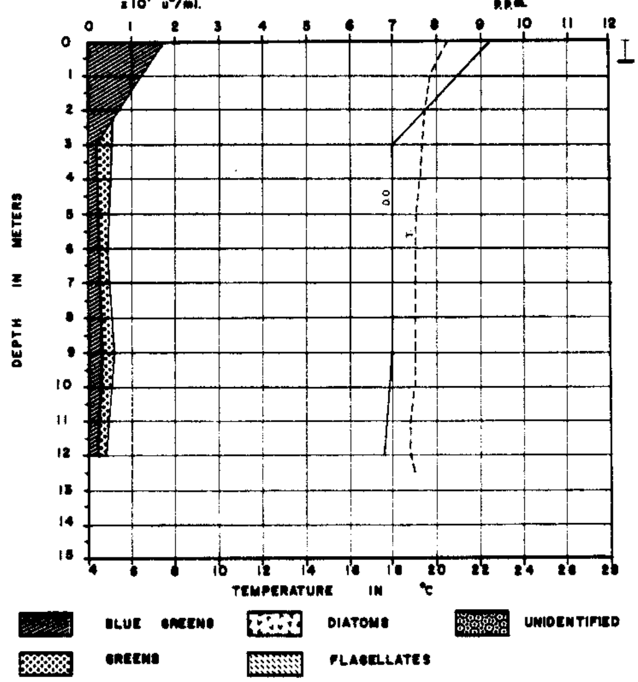


CLEAR LAKE STA. 4

DATE 10-16-70

AVG. u^3/ml. 6,961,726

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.15	0.32	1.7	.10	0.10	
BOTT.	0.18	0.25	0.6	.11	0.14	

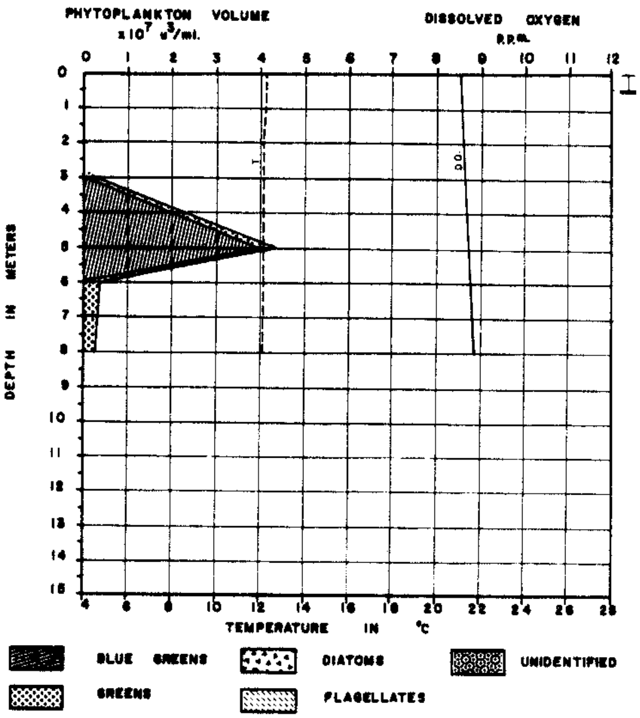


CLEAR LAKE STA. 1

DATE 11-9-70

AVG. u^3/ml. 10,331,441

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.25	0.32	1.0	0.00	0.39	
BOTT.	0.26	0.31	0.6	0.00	0.44	

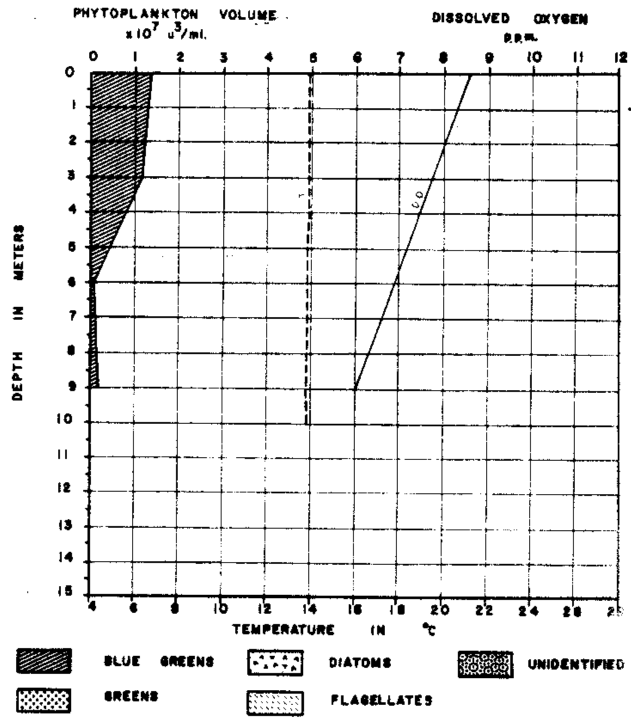


CLEAR LAKE STA. 3

DATE 11-9-70

AVG. u^3/ml. 19,534,567

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.60	0.07	0.7	0.19	0.10	
BOTT.	0.02	0.09	0.7	0.35	0.10	

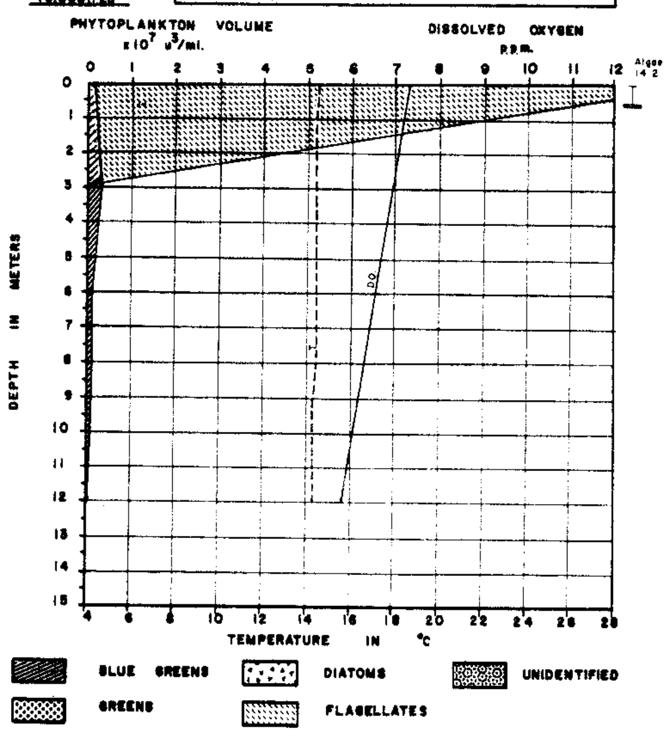


CLEAR LAKE STA. 4

DATE 11-9-70

AVG. u^3/ml. 19,553,725

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.15	0.18	0.6	0.14	0.29	
BOTT.	0.40	0.23	0.6	0.19	0.30	

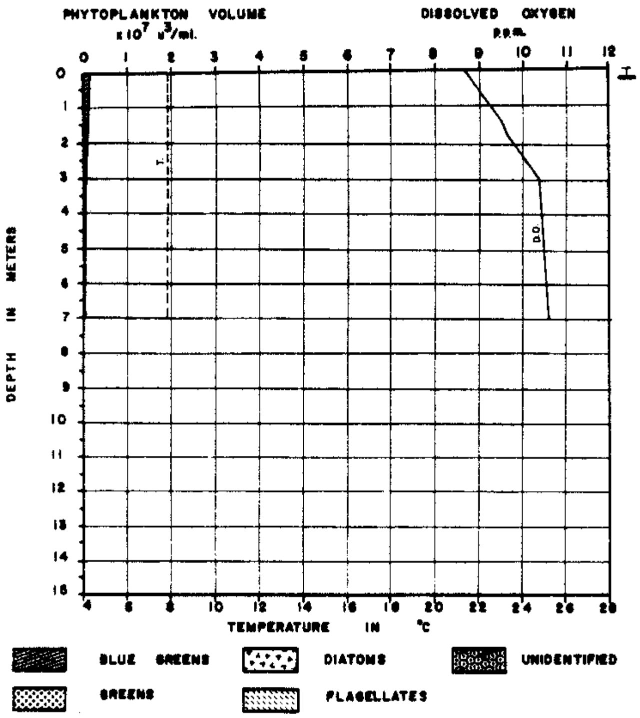


CLEAR LAKE STA. 1

DATE 12-23-70

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.10	0.18	0.4	0.00	0.61	
BOTT.	0.10	0.18	0.4	0.01	0.52	

AVG. u^3/ml.
610,041

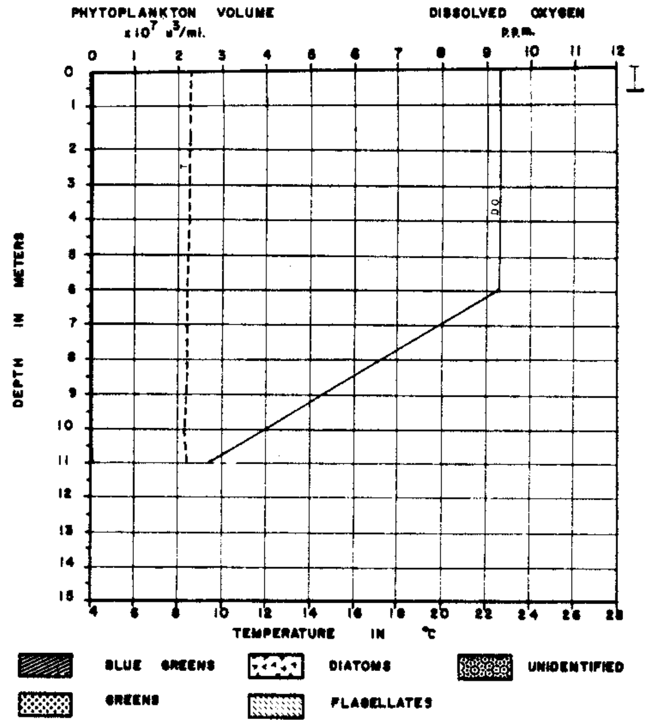


CLEAR LAKE STA. 3

DATE 12-23-70

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.06	0.5	0.00	0.68	
BOTT.	0.02	0.10	0.4	0.08	0.56	

AVG. u^3/ml.
57,258

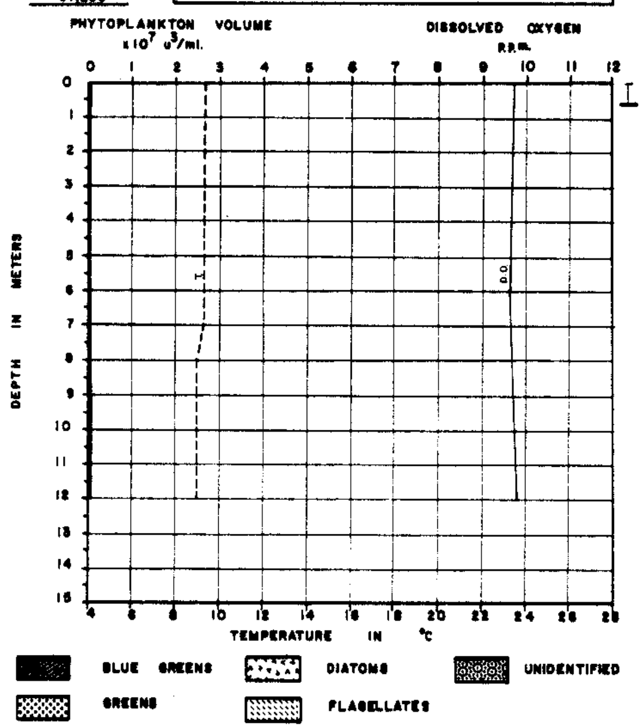


CLEAR LAKE STA. 4

DATE 12-23-70

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.12	0.4	0.02	0.60	
BOTT.	0.06	0.12	0.4	0.00	0.60	

AVG. u^3/ml.
57,258

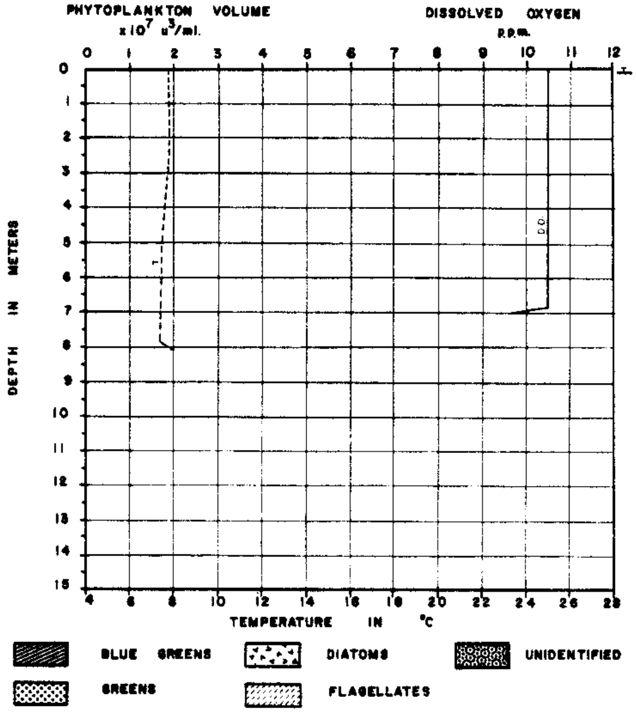


CLEAR LAKE STA. 1

DATE 1-27-71

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.08	0.10	0.4	0.00	0.47	______
BOTT.	0.09	0.12	0.4	0.00	0.56	______

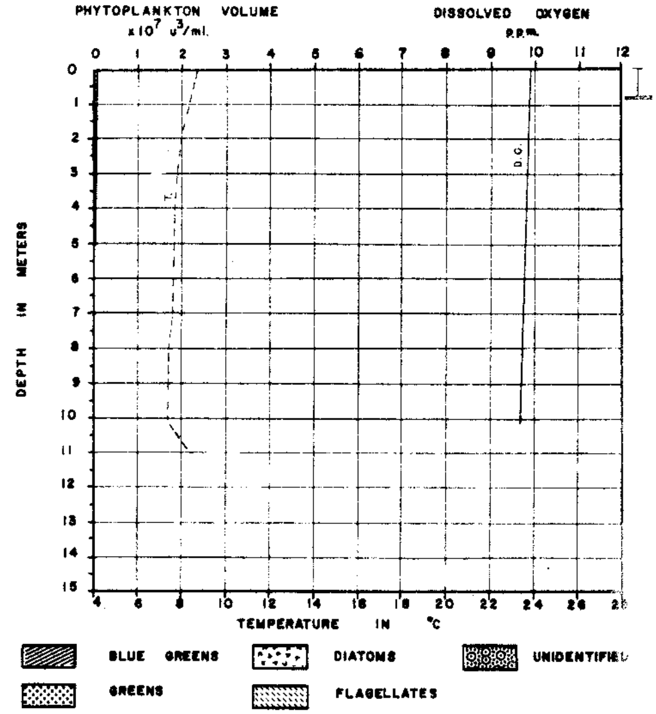


CLEAR LAKE STA. 3

DATE 1-27-71

AVG. u^3/ml ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.06	0.5	0.00	0.66	______
BOTT.	0.03	0.06	0.4	0.00	0.70	______

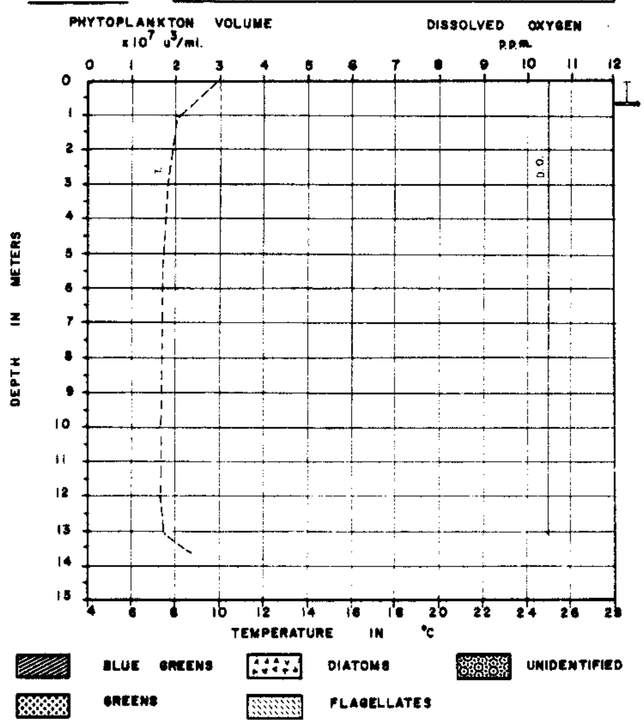


CLEAR LAKE STA. 4

DATE 1-27-71

AVG. u^3/ml. ______

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.07	0.10	0.5	0.00	0.68	______
BOTT.	0.06	0.10	0.5	0.01	0.65	______

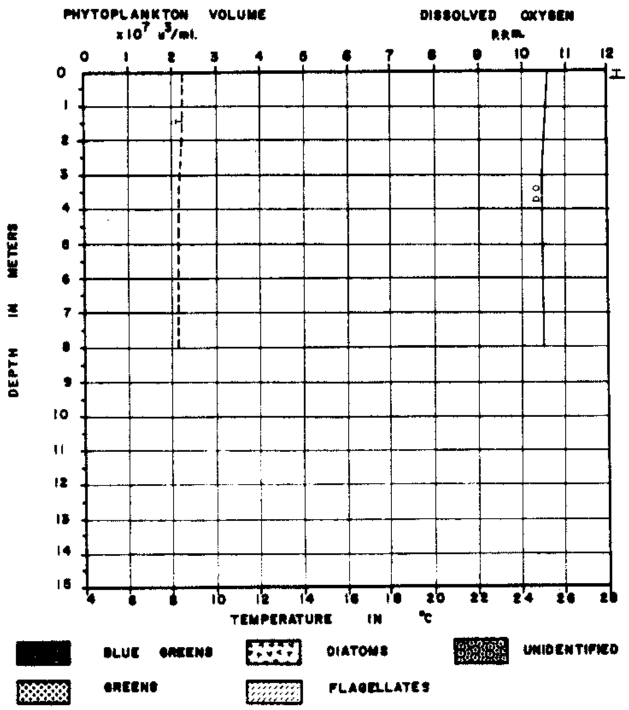


CLEAR LAKE STA. 1

DATE 2-25-71

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.11	0.4	0.00	0.55	81
BOTT.	0.08	0.10	0.4	0.00	0.52	89

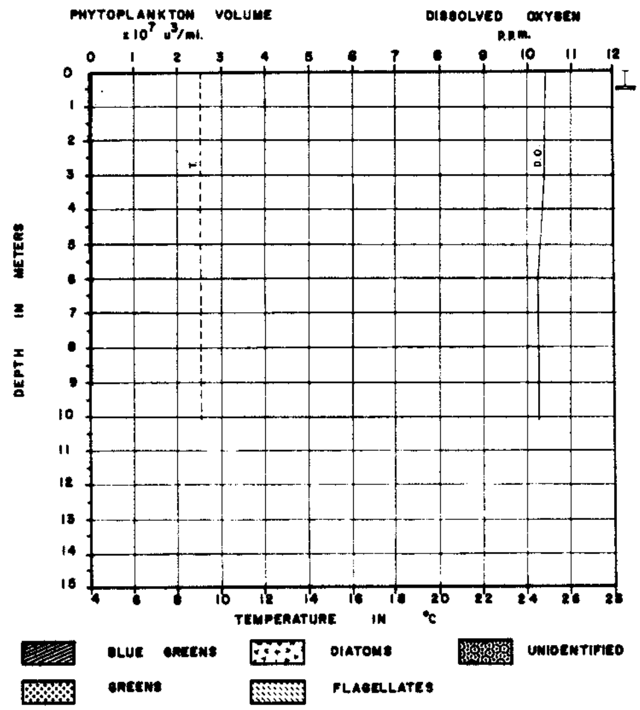


CLEAR LAKE STA. 3

DATE 2-25-71

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.06	0.5	0.00	0.61	10.8
BOTT.	0.03	0.06	0.6	0.00	0.58	11.0

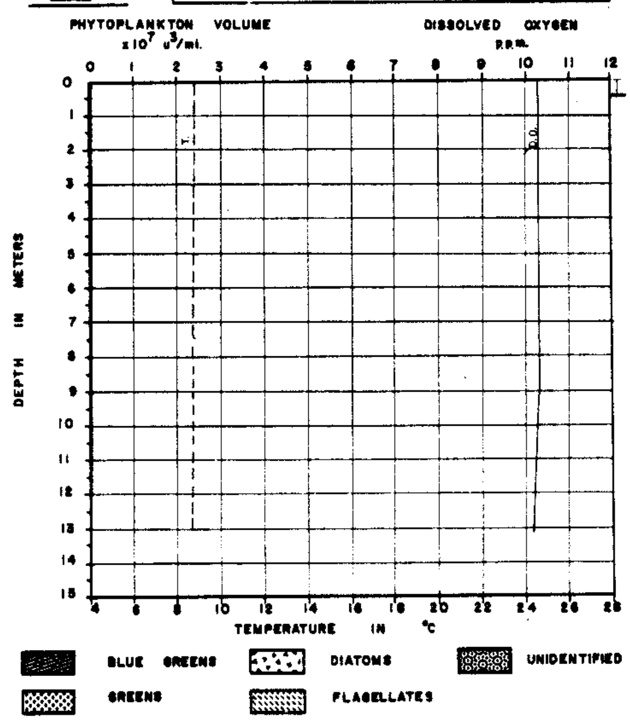


CLEAR LAKE STA. 4

DATE 2-25-71

AVG. u^3/ml. ____

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.05	0.09	0.5	0.00	0.65	103
BOTT.	0.08	0.10	0.5	0.00	0.58	94

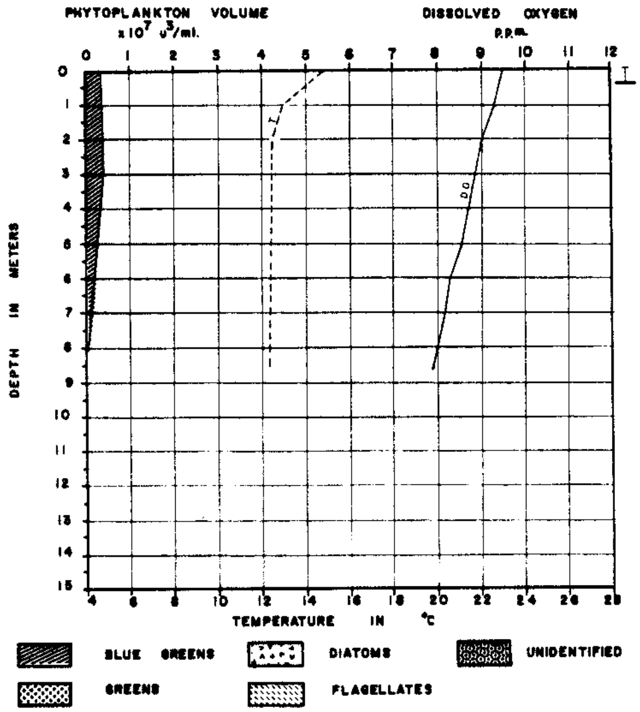


CLEAR LAKE STA. 1

DATE 4-21-71

AVG. u^3/ml. 88,567

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.05	0.08	0.4	0.02	0.57	108
BOTT.	0.05	0.09	0.4	0.00	0.58	107

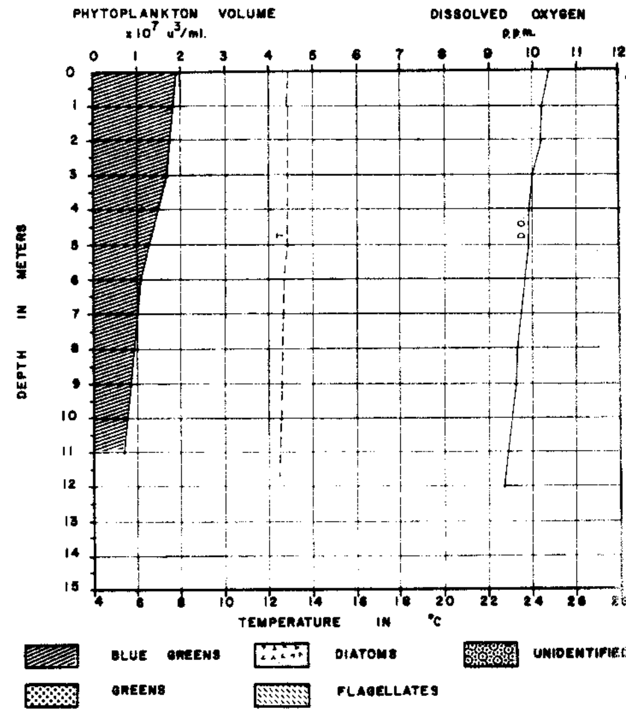


CLEAR LAKE STA. 3

DATE 4-21-71

AVG. u^3/ml. 13,111,931

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.09	0.8	0.00	0.67	120
BOTT.	0.01	0.07	0.7	0.00	0.69	120

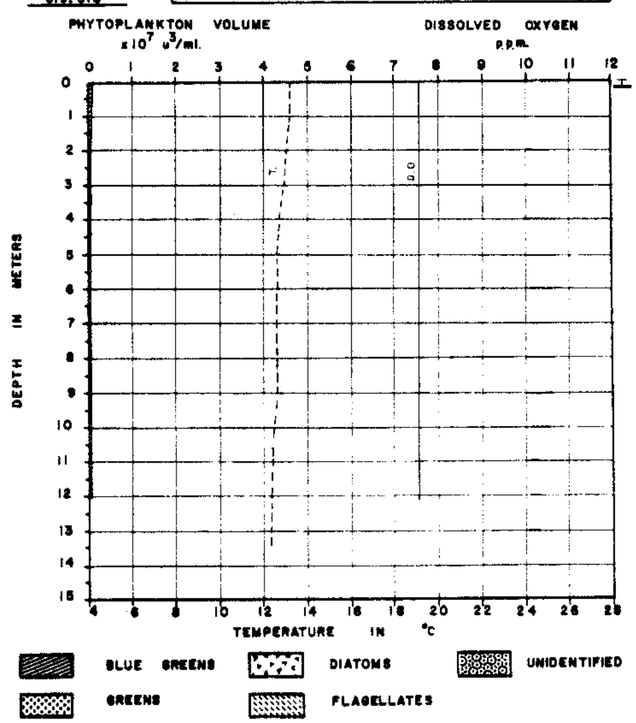


CLEAR LAKE STA. 4

DATE 4-21-71

AVG. u^3/ml. 519,318

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.09	0.5	0.00	0.62	112
BOTT.	0.04	0.10	0.5	0.00	0.61	112

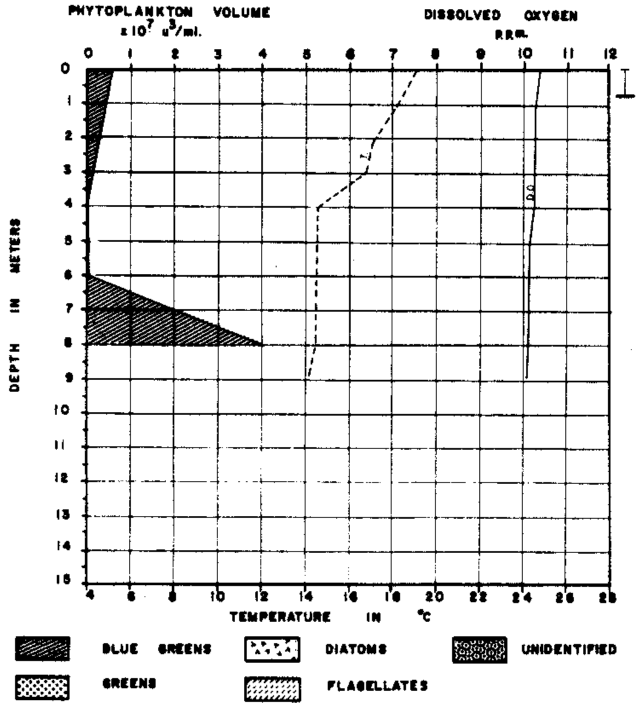


CLEAR LAKE STA. 1

DATE 5-12-71

AVG. u^3/ml. 5,302,960

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.06	0.5	0.00	0.46	115
BOTT.	0.05	0.07	0.4	0.00	0.52	99

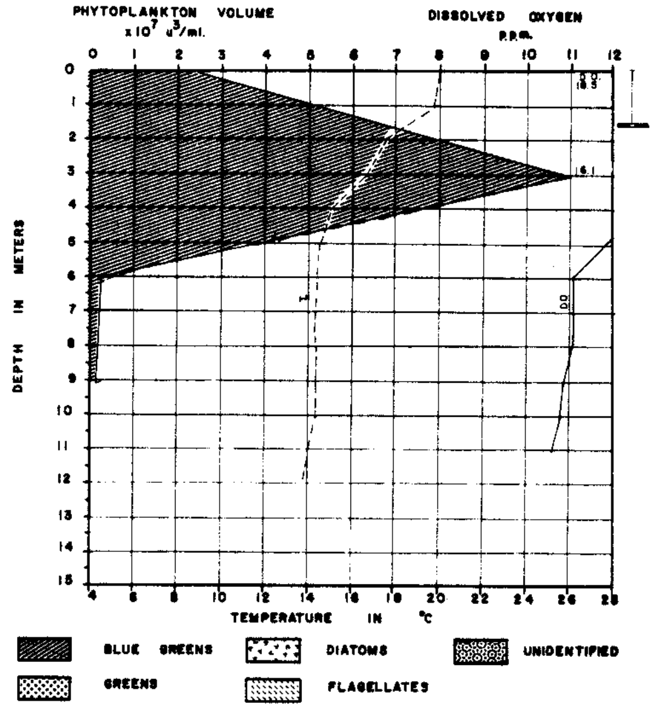


CLEAR LAKE STA. 3

DATE 5-12-71

AVG. u^3/ml. 33,675,959

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.03	0.7	0.03	0.06	118
BOTT.	0.01	0.02	0.4	0.02	0.41	108

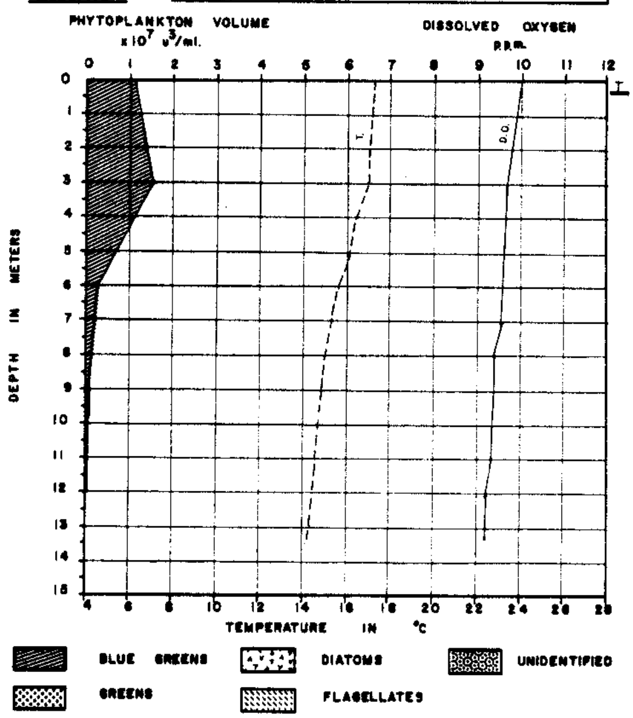


CLEAR LAKE STA. 4

DATE 5-12-71

AVG. u^3/ml. 5,929,473

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.06	0.6	0.00	0.46	107
BOTT.	0.04	0.06	0.4	0.02	0.55	98

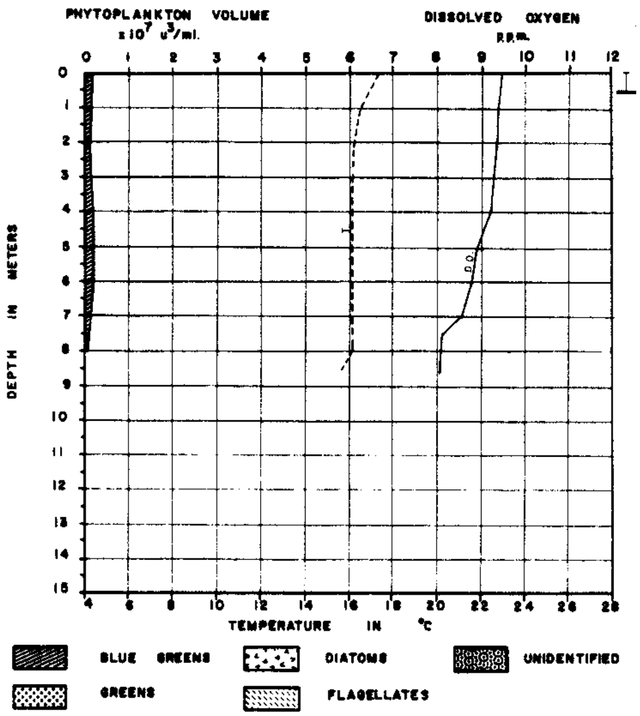


CLEAR LAKE STA. 1

DATE 5-17-71

AVG. u^3/ml. 1,904,720

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.06	0.4	0.00	0.50	114
BOTT.	0.04	0.06	0.4	0.00	0.51	121

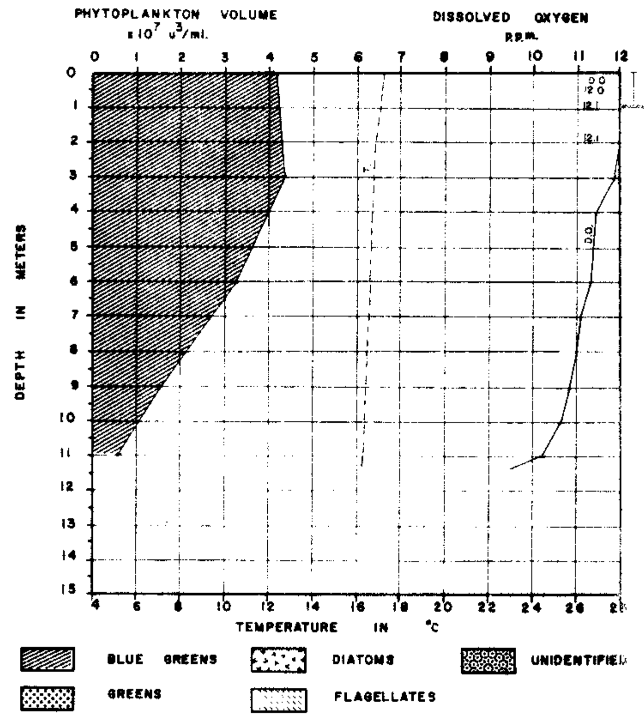


CLEAR LAKE STA. 3

DATE 5-17-71

AVG. u^3/ml. 31,372,886

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.03	1.0	0.00	0.02	126
BOTT.	0.01	0.04	0.6	0.06	0.08	128

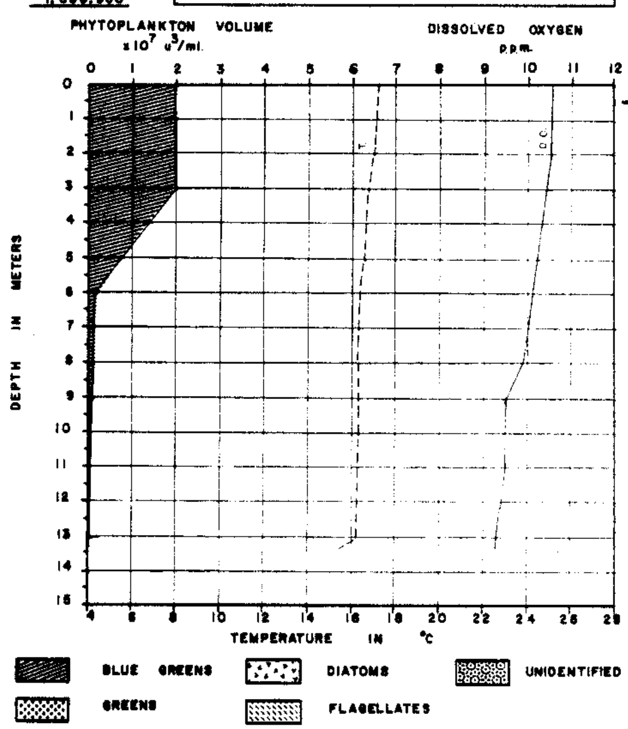


CLEAR LAKE STA. 4

DATE 5-17-71

AVG. u^3/ml. 7,899,953

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.06	0.6	0.00	0.42	112
BOTT.	0.02	0.05	0.4	0.01	0.48	116

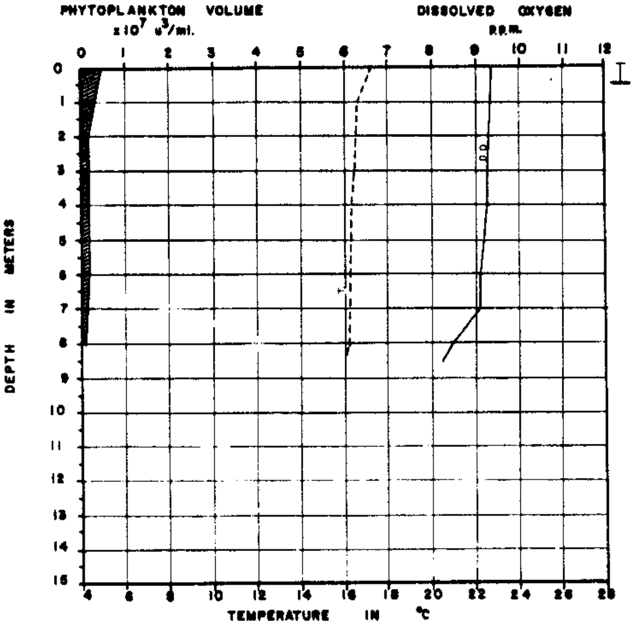


CLEAR LAKE STA. 1

DATE 8-21-71

AVG. u^3/ml. 2,660,226

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.07	0.5	0.00	0.49	130
BOTT.	0.03	0.06	0.4	0.00	0.50	130



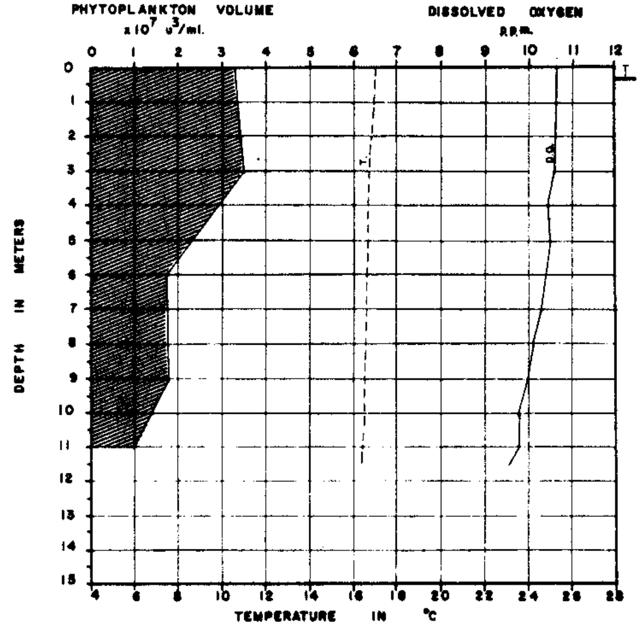
BLUE GREENS DIATOMS UNIDENTIFIED
GREENS FLAGELLATES

CLEAR LAKE STA. 3

DATE 8-21-71

AVG. u^3/ml. 23,663,502

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.08	1.0	0.00	0.03	127
BOTT.	0.01	0.08	0.7	0.04	0.11	129



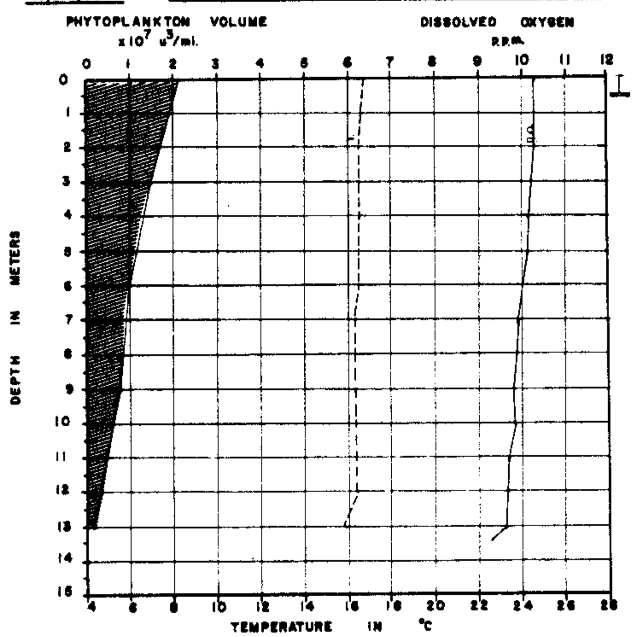
BLUE GREENS DIATOMS UNIDENTIFIED
GREENS FLAGELLATES

CLEAR LAKE STA. 4

DATE 8-21-71

AVG. u^3/ml. 10,913,523

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.07	0.7	0.00	0.37	123
BOTT.	0.03	0.05	0.5	0.01	0.40	122



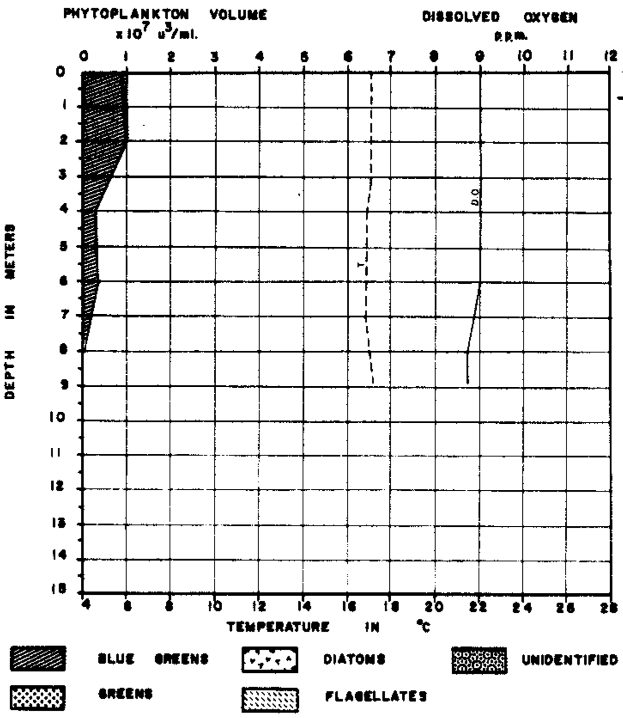
BLUE GREENS DIATOMS UNIDENTIFIED
GREENS FLAGELLATES

CLEAR LAKE STA. 1

DATE 5-28-71

AVG. u^3/ml. 5,712,018

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.06	0.6	0.01	0.35	122
BOTT.	0.03	0.06	0.5	0.01	0.38	126

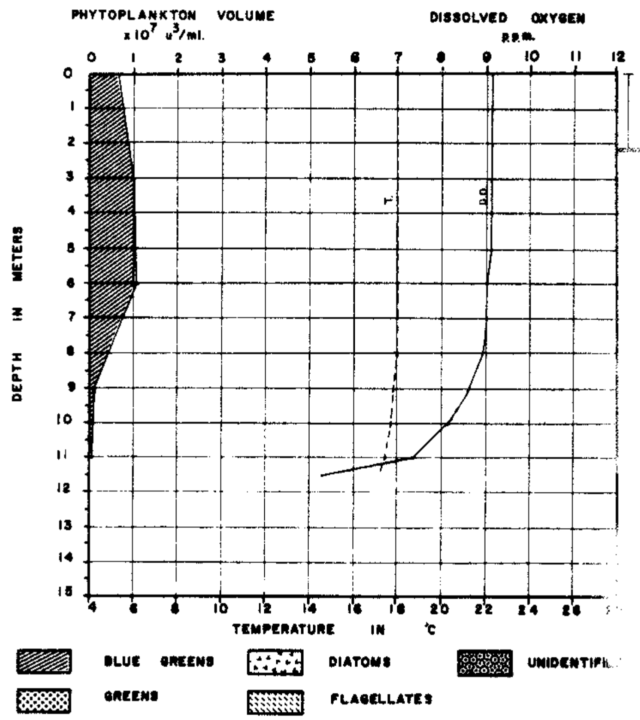


CLEAR LAKE STA. 3

DATE 5-28-71

AVG. u^3/ml. 6,833,772

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.03	0.6	0.01	0.02	138
BOTT.	0.04	0.07	0.7	0.46	0.04	139

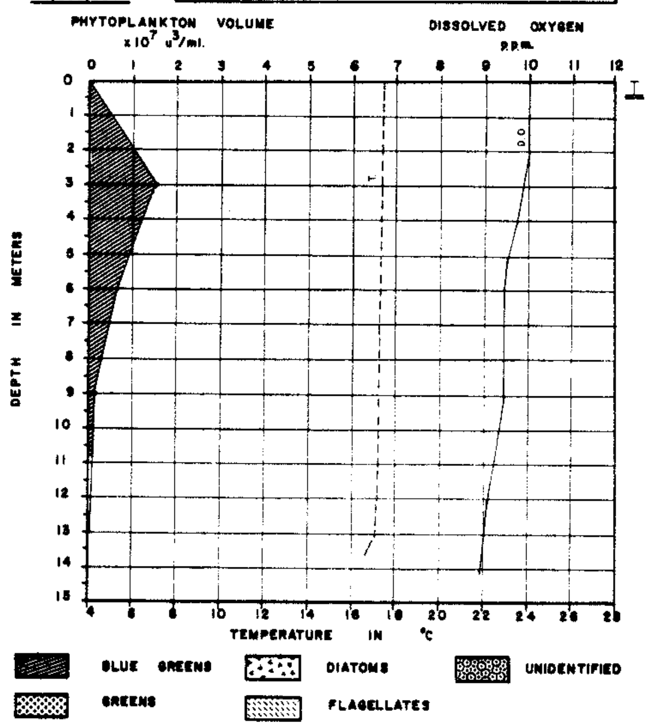


CLEAR LAKE STA. 4

DATE 5-28-71

AVG. u^3/ml. 14,596,664

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.10	1.4	0.03	0.19	123
BOTT.	0.02	0.05	0.4	0.04	0.22	125

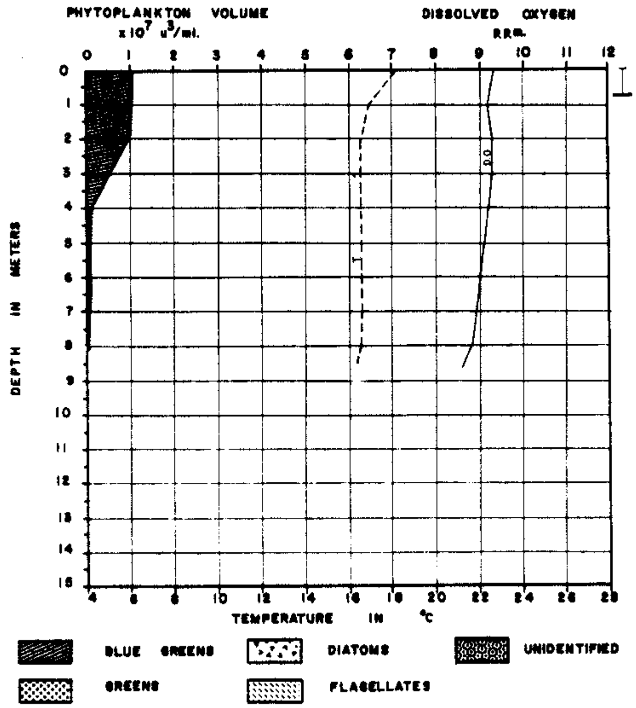


CLEAR LAKE STA. 1

DATE 6-2-71

AVG. u^3/ml.
4,612,944

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.05	0.4	0.00	0.27	121
BOTT.	0.02	0.05	0.3	0.01	0.32	123

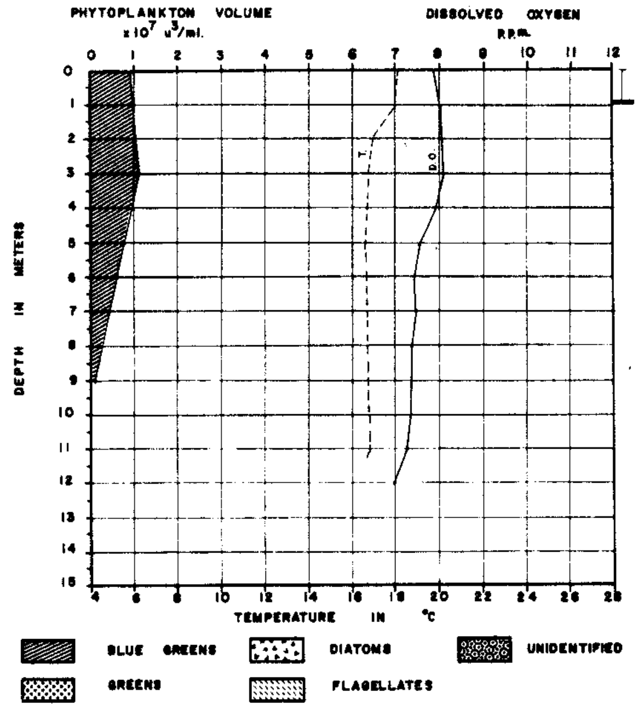


CLEAR LAKE STA. 3

DATE 6-2-71

AVG. u^3/ml.
6,382,353

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.06	0.5	0.11	0.09	139
BOTT.	0.01	0.04	0.4	0.33	0.09	135

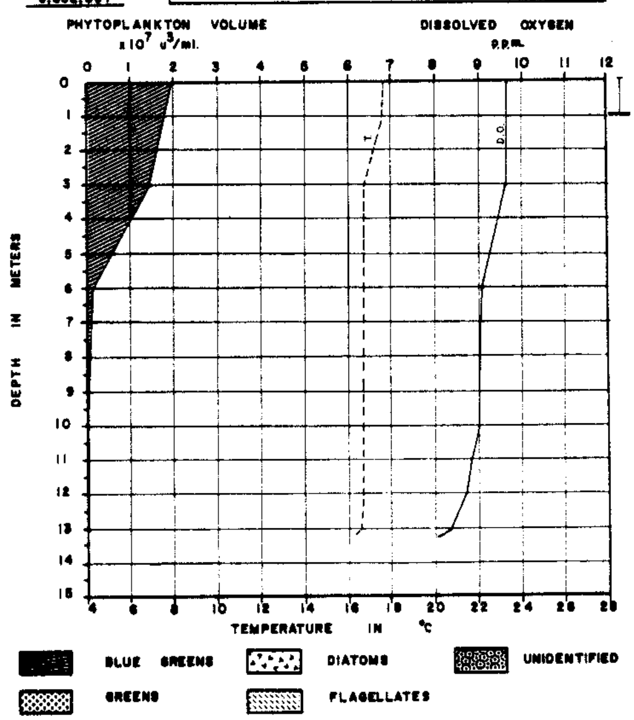


CLEAR LAKE STA. 4

DATE 6-2-71

AVG. u^3/ml.
6,652,697

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.05	0.6	0.00	0.20	126
BOTT.	0.02	0.05	0.4	0.04	0.20	123

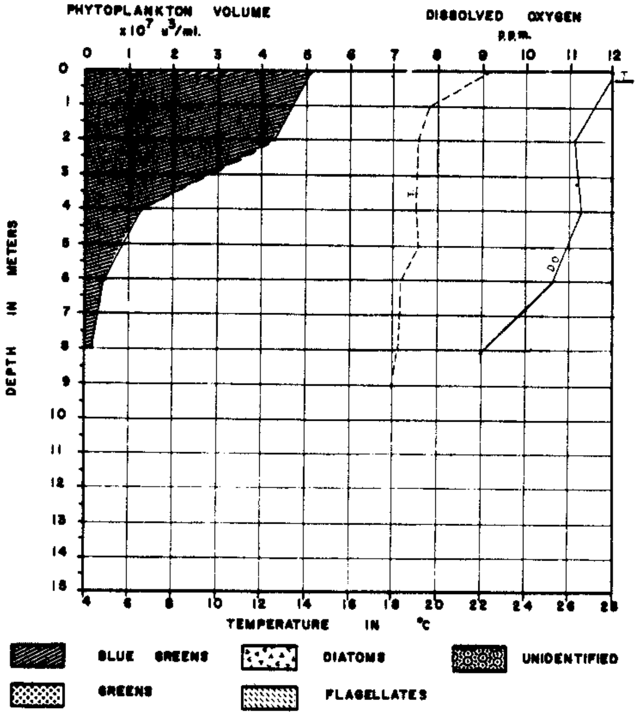


CLEAR LAKE STA. 1

DATE 6-11-71

AVG. $u^3/ml.$ 20,943,918

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.10	1.7	0.00	0.04	132
BOTT.	0.02	0.05	0.4	0.00	0.13	117

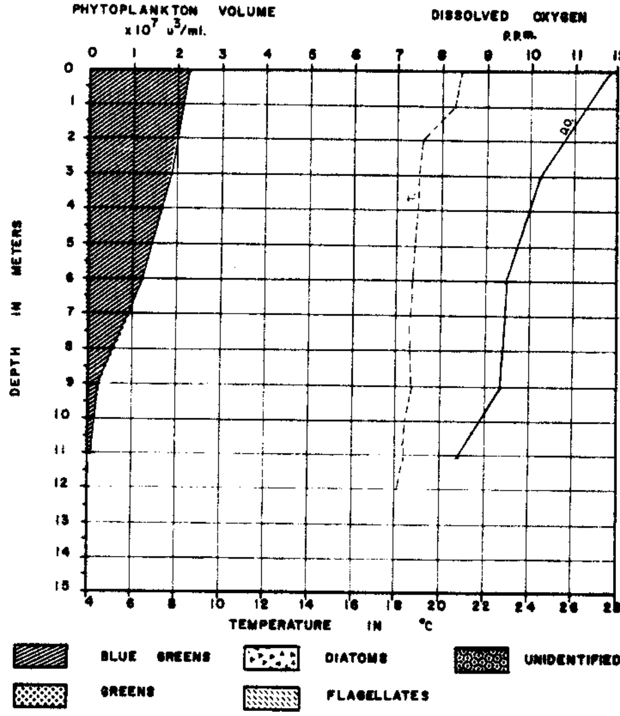


CLEAR LAKE STA. 3

DATE 6-11-71

AVG. $u^3/ml.$ 12,324,542

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.04	0.7	0.00	0.06	138
BOTT.	0.01	0.03	0.4	0.10	0.09	133

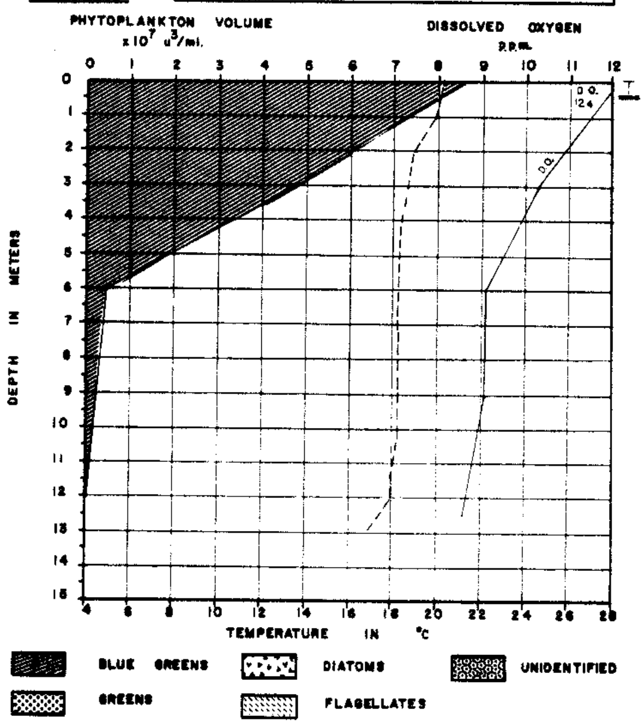


CLEAR LAKE STA. 4

DATE 6-11-71

AVG. $u^3/ml.$ 22,504,063

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.13	2.0	0.03	0.04	130
BOTT.	0.02	0.05	0.4	0.13	0.12	127

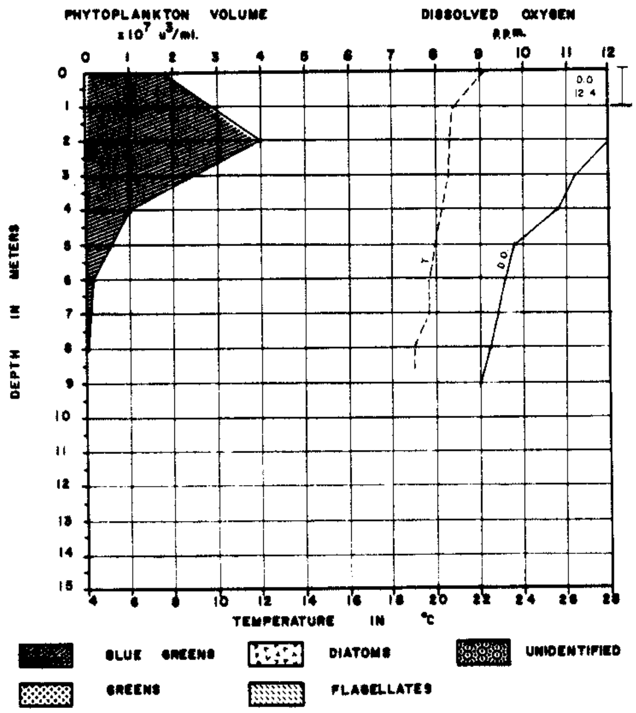


CLEAR LAKE STA. I

DATE 6-15-71

AVG. u^3/ml.
14,759,088

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.04	0.6	0.00	0.04	135
BOTT.	0.02	0.04	0.3	0.02	0.06	127

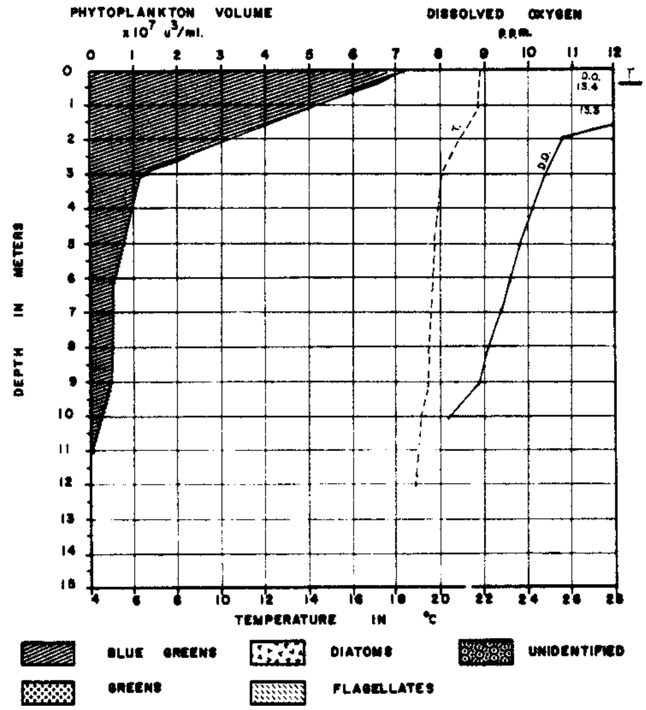


CLEAR LAKE STA. 3

DATE 6-16-71

AVG. u^3/ml.
16,411,759

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.10	2.0	0.00	0.04	138
BOTT.	0.02	0.04	0.8	0.38	0.06	137

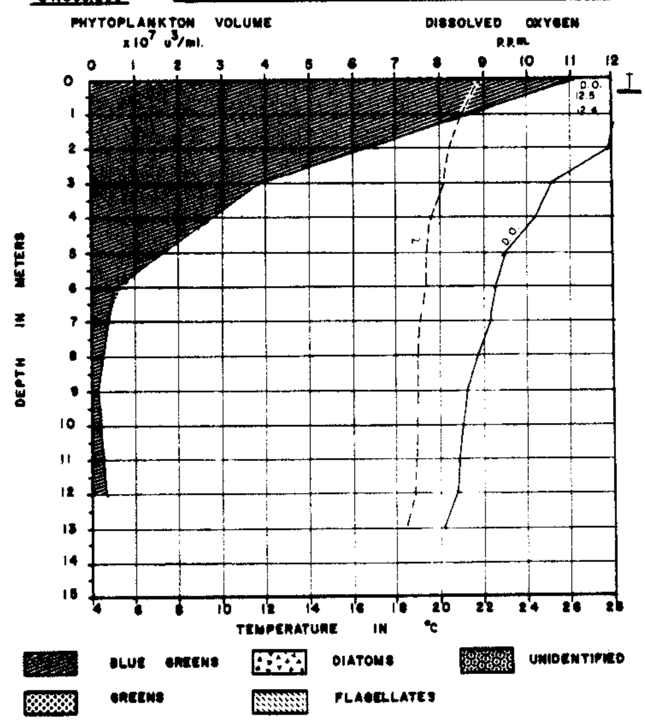


CLEAR LAKE STA. 4

DATE 6-15-71

AVG. u^3/ml.
24,665,205

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.14	2.2	0.00	0.05	129
BOTT.	0.02	0.07	0.4	0.07	0.07	129

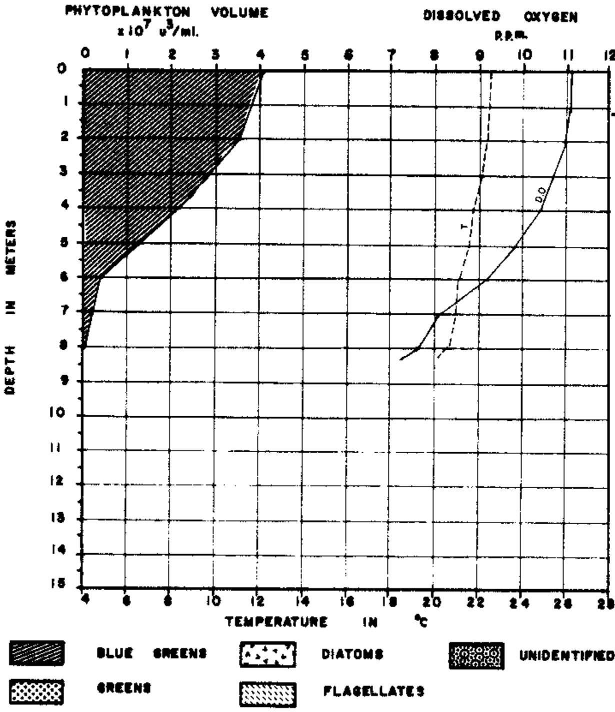


CLEAR LAKE STA. 1

DATE 6-23-71

AVG. u^3/ml. 21,380,207

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.05	0.8	0.00	0.01	131
BOTT.	0.01	0.08	0.4	0.05	0.03	130

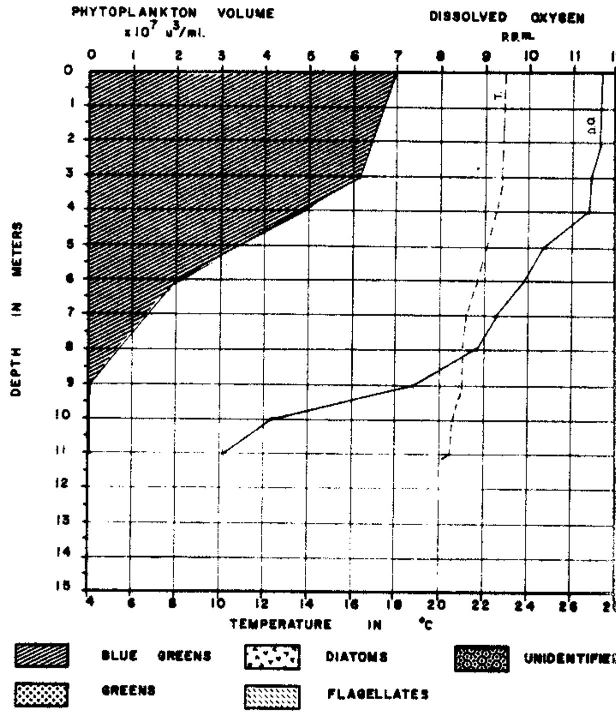


CLEAR LAKE STA. 3

DATE 6-23-71

AVG. u^3/ml. 32,380,479

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.03	1.8	0.02	0.03	136
BOTT.	0.00	0.09	0.6	0.39	0.02	137

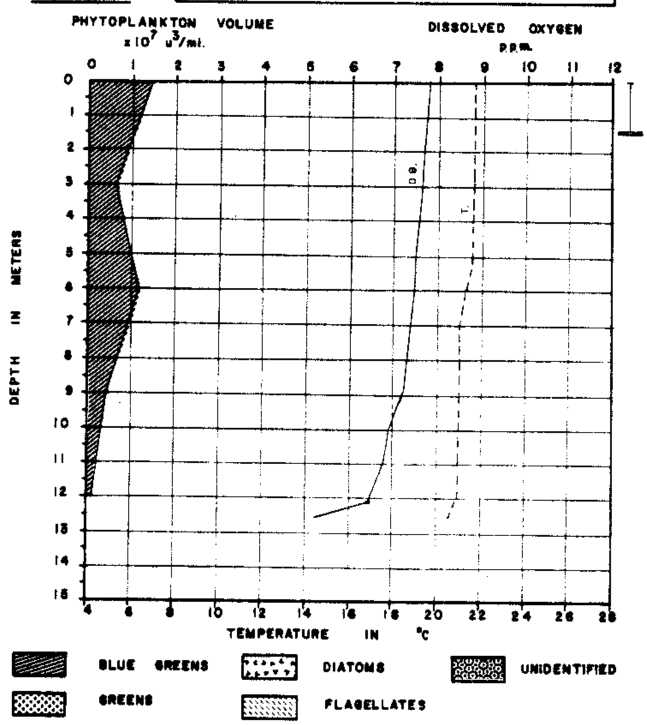


CLEAR LAKE STA. 4

DATE 6-23-71

AVG. u^3/ml. 8,242,974

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.08	0.7	0.19	0.06	128
BOTT.	0.01	0.08	0.5	0.17	0.02	124

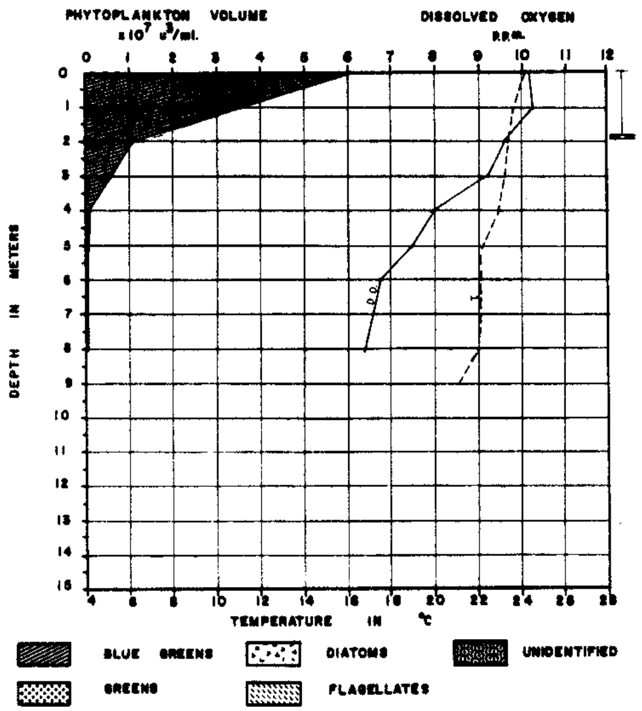


CLEAR LAKE STA. 1

DATE 7-7-71

AVG. u^3/ml. 10,997,331

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.09	1.1	0.00	0.01	___
BOTT.	0.05	0.09	0.6	0.13	0.05	___

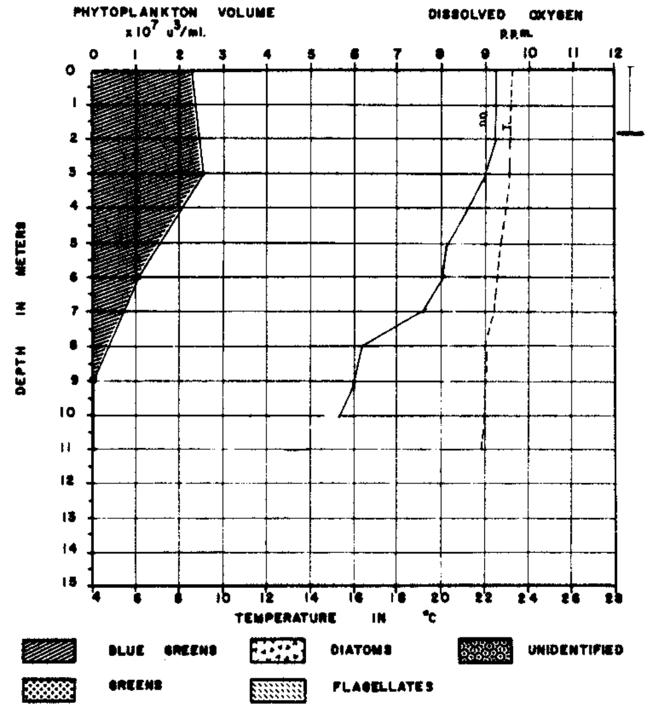


CLEAR LAKE STA. 3

DATE 7-7-71

AVG. u^3/ml. 13,909,496

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.06	1.0	0.10	0.01	___
BOTT.	0.04	0.06	0.7	0.36	0.03	___

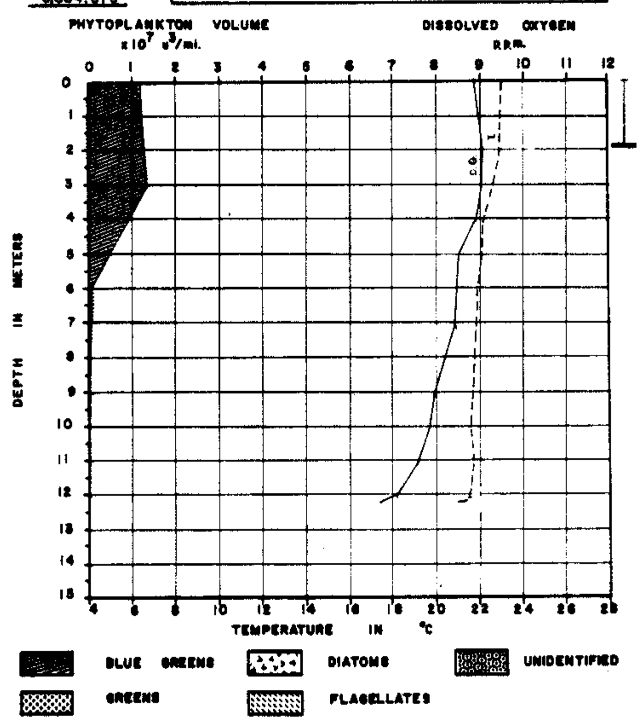


CLEAR LAKE STA. 4

DATE 7-7-71

AVG. u^3/ml. 5,354,570

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.08	0.8	0.29	0.04	___
BOTT.	0.09	0.12	0.6	0.31	0.05	___

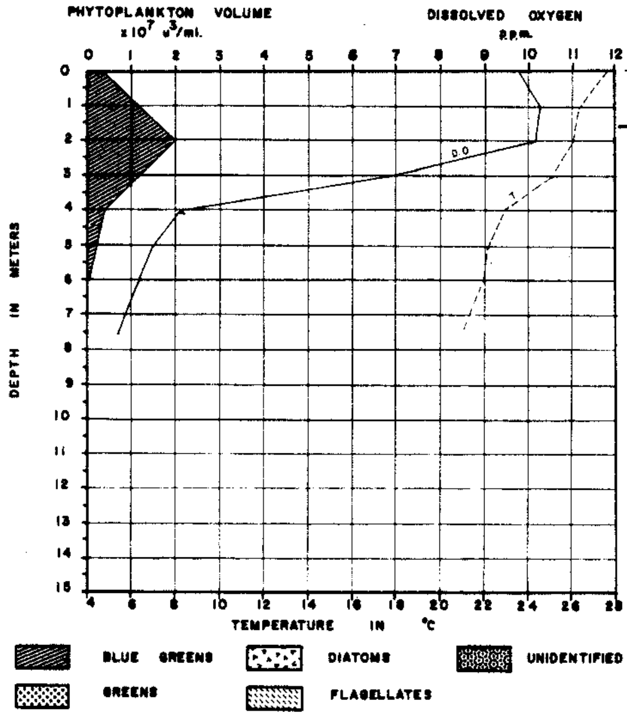


CLEAR LAKE STA. 1

DATE 7-28-71

AVG. u^3/ml. 7,635,264

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.44	0.75	0.5	0.00	0.01	132
BOTT.	0.01	0.02	0.6	0.49	0.00	140

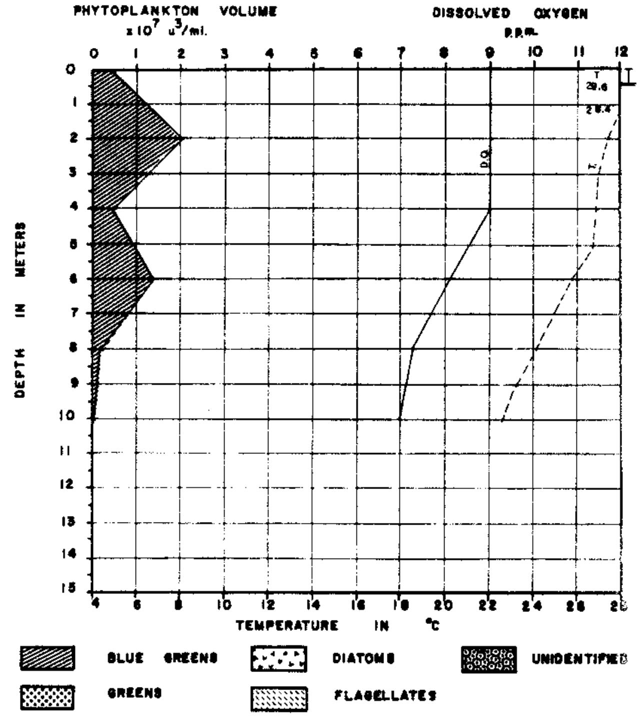


CLEAR LAKE STA. 3

DATE 7-28-71

AVG. u^3/ml. 9,429,081

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.04	0.7	0.00	0.00	138
BOTT.	0.30	0.48	0.8	1.20	0.04	147

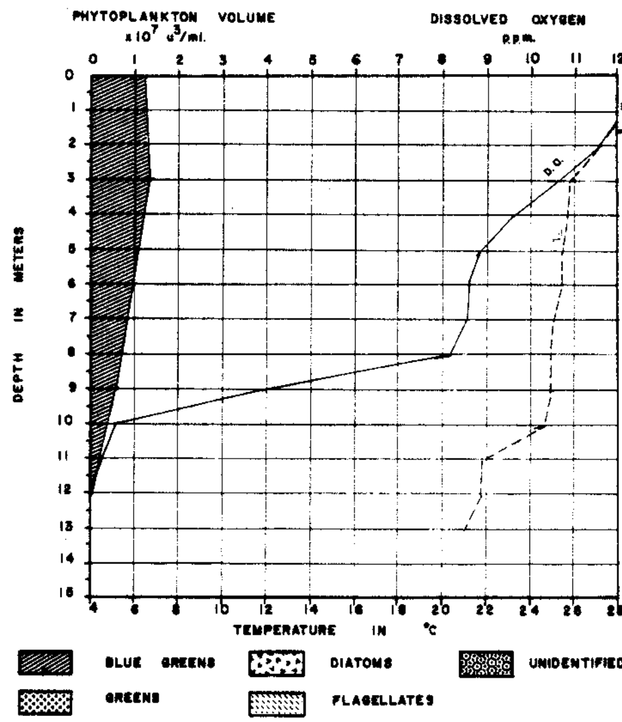


CLEAR LAKE STA. 4

DATE 7-28-71

AVG. u^3/ml. 8,901,887

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.06	0.8	0.00	0.00	130
BOTT.	0.44	0.45	0.6	0.99	0.03	143

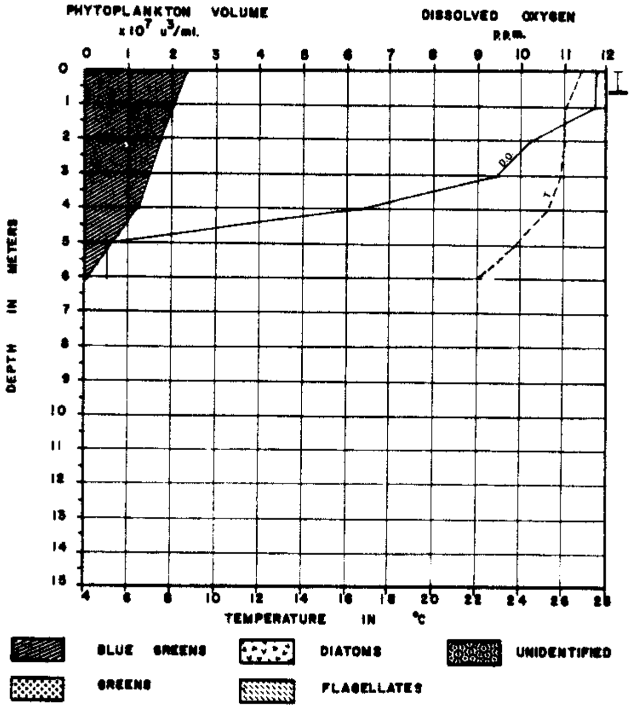


CLEAR LAKE STA. 1

DATE 8-9-71

AVG. u³/ml. 12,559,206

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	.05	0.13	1.0	0.00	0.02	
BOTT.	.31	0.38	0.6	0.55	0.02	

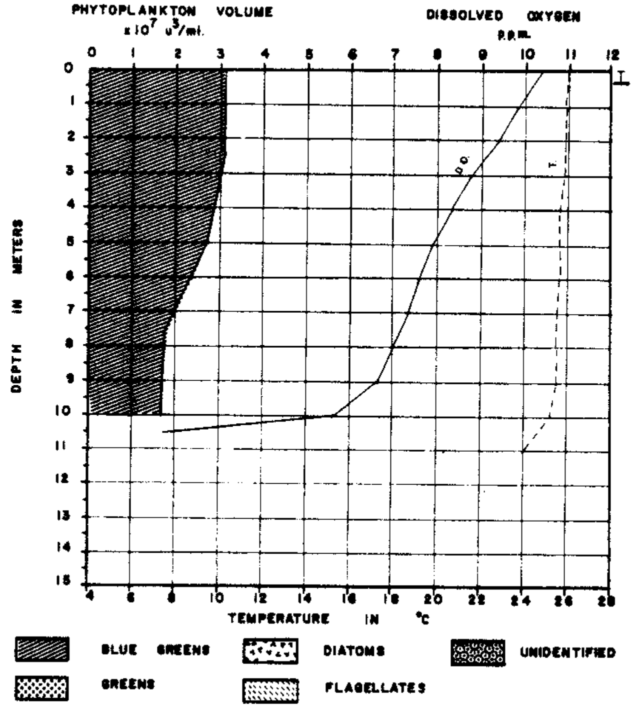


CLEAR LAKE STA. 3

DATE 8-9-71

AVG. u³/ml. 25,521,808

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.07	1.2	0.00	0.02	139
BOTT.	0.00	0.07	1.2	0.04	0.01	139

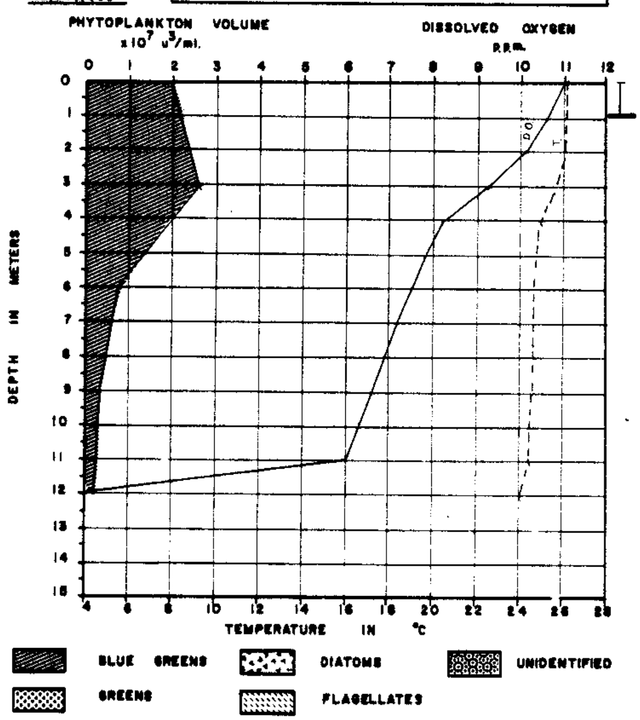


CLEAR LAKE STA. 4

DATE 8-9-71

AVG. u³/ml. 12,549,388

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.11	1.6	0.04	0.03	131
BOTT.	0.08	0.22	0.8	0.51	0.02	133

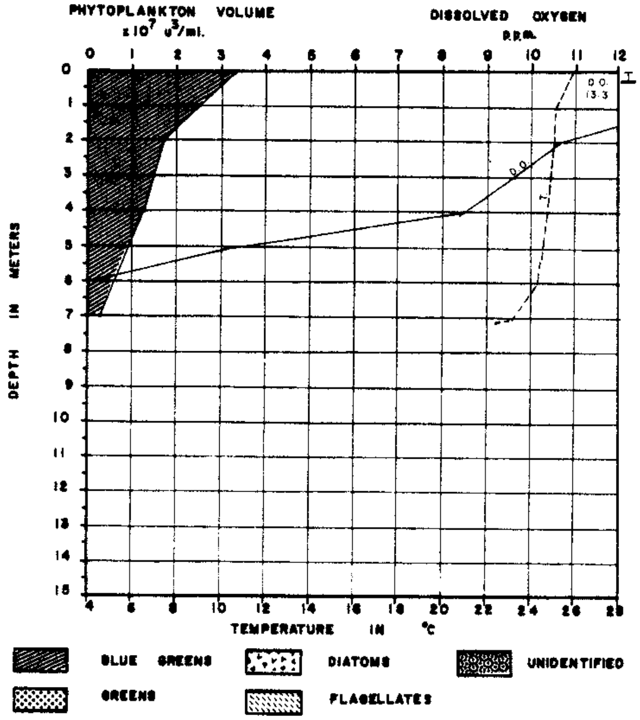


CLEAR LAKE STA. 1

DATE 8-26-71

AVG. u^3/ml. 18,623,954

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	.07	0.21	1.3	0.00	0.01	
BOTT.	.02	0.33	0.8	0.21	0.01	

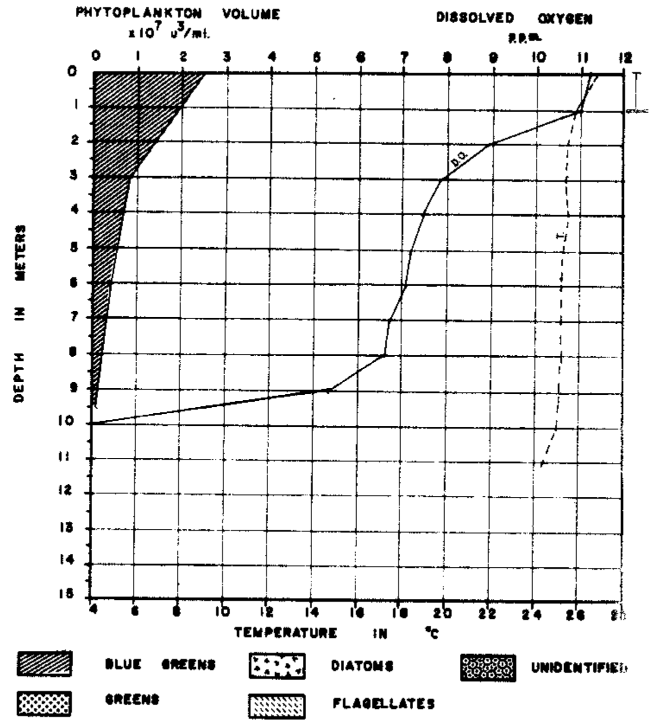


CLEAR LAKE STA. 3

DATE 8-26-71

AVG. u^3/ml. 6,136,162

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.17	2.1	0.00	0.01	143
BOTT.	0.00	0.06	0.8	0.28	0.01	146

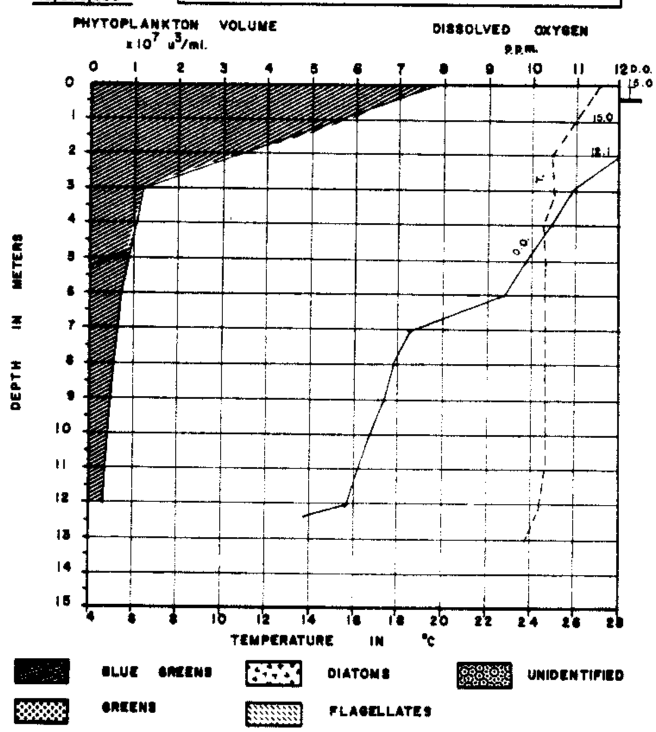


CLEAR LAKE STA. 4

DATE 8-26-71

AVG. u^3/ml. 16,826,636

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.30	2.6	0.00	0.01	139
BOTT.	0.05	0.12	0.7	0.28	0.02	141

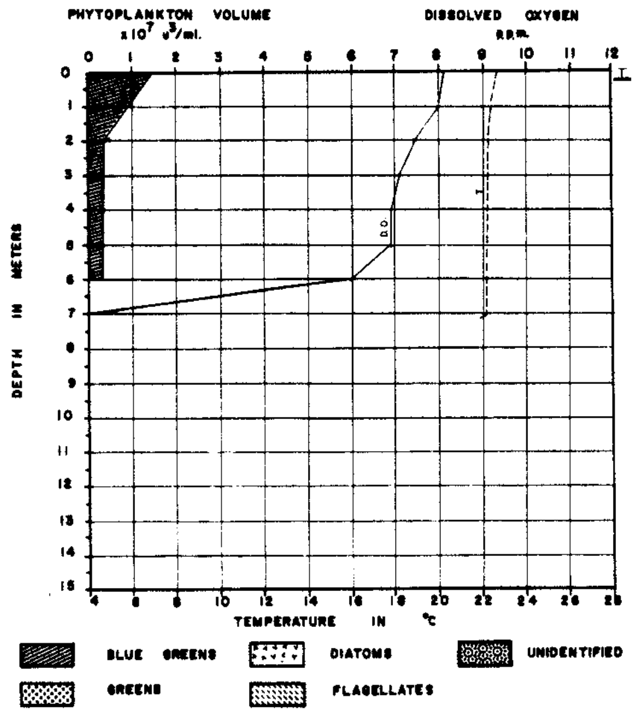


CLEAR LAKE STA. 1

DATE 9-8-71

AVG. u^3/ml. 5,163,348

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	.08	0.19	1.0	0.02	0.01	
BOTT.	.08	0.20	0.8	0.40	0.01	

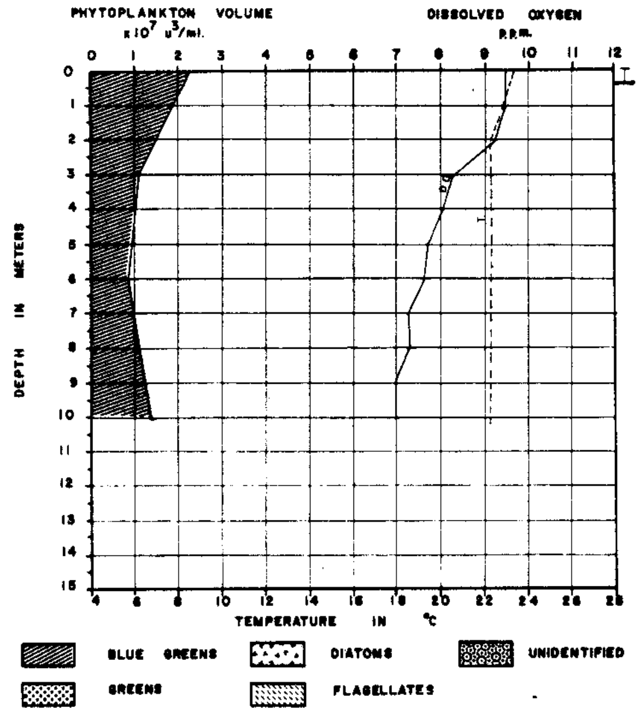


CLEAR LAKE STA. 3

DATE 9-8-71

AVG. u^3/ml. 13,278,113

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.09	1.0	0.00	0.27	166
BOTT.	0.00	0.09	0.7	0.00	0.28	166

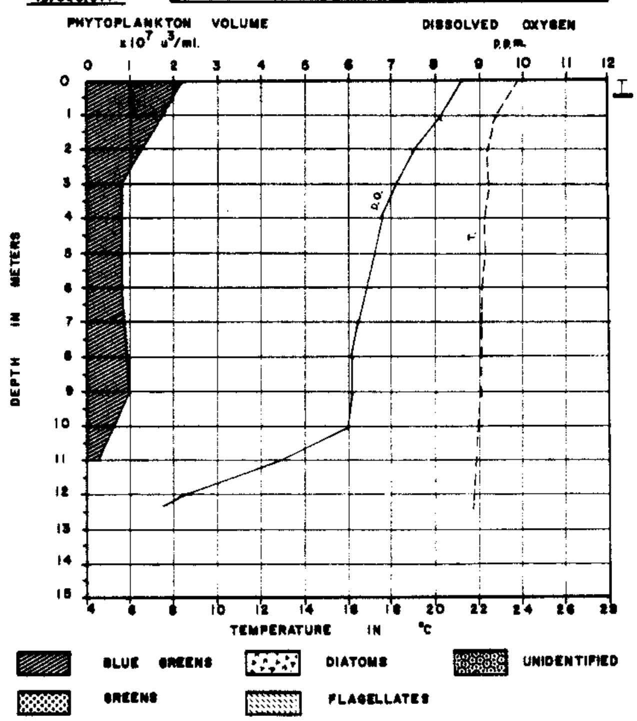


CLEAR LAKE STA. 4

DATE 9-8-71

AVG. u^3/ml. 10,006,671

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.20	1.5	0.10	0.23	187
BOTT.	0.07	0.16	0.8	0.00	0.40	180

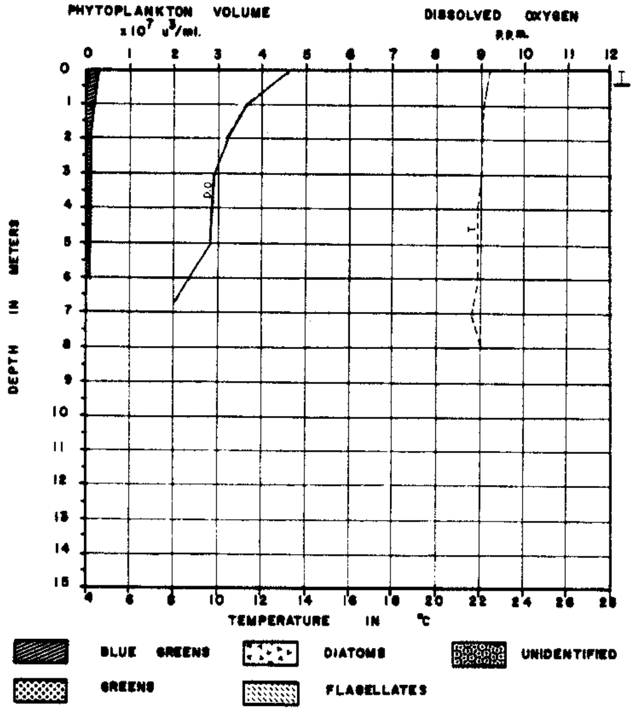


CLEAR LAKE STA. 1

DATE 9-23-71

AVG. u^3/ml.
1,847,111

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.16	0.23	0.6	0.12	0.16	167
BOTT.	0.16	0.25	0.7	0.12	0.18	168

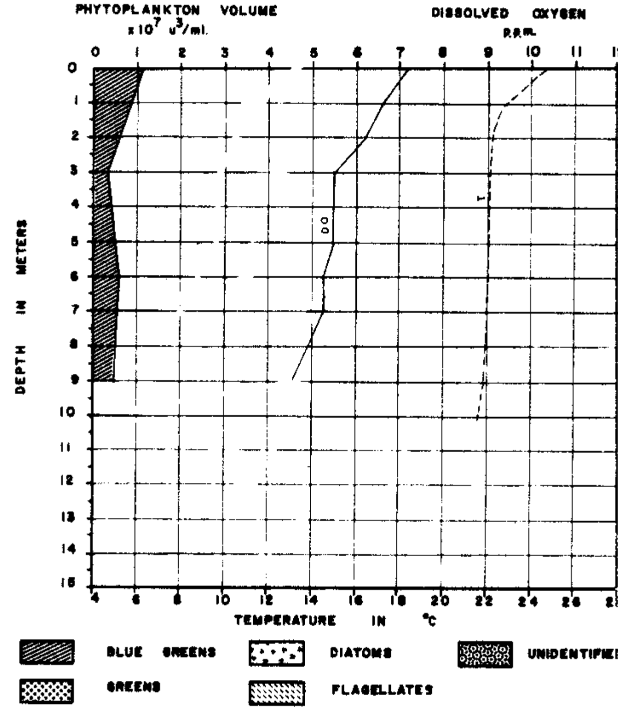


CLEAR LAKE STA. 3

DATE 9-23-71

AVG. u^3/ml.
5,847,003

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.06	0.8	0.05	0.22	168
BOTT.	0.00	0.07	0.7	0.12	0.22	171

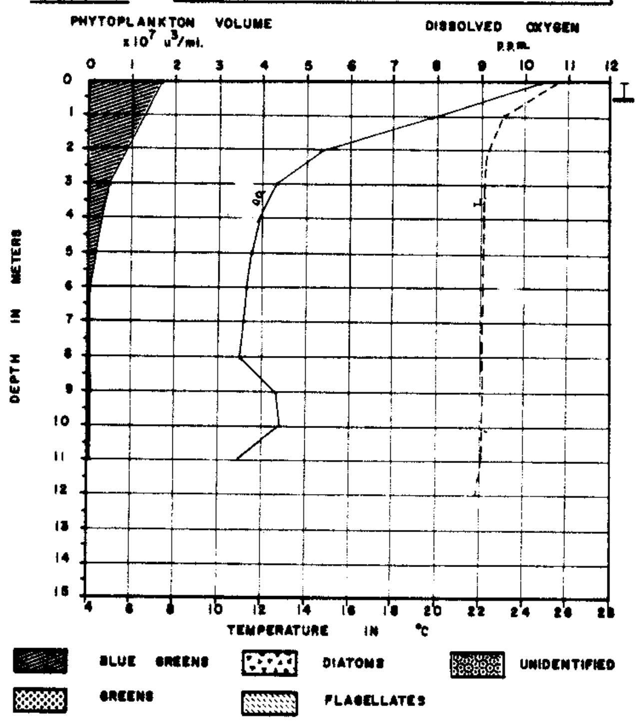


CLEAR LAKE STA. 4

DATE 9-23-71

AVG. u^3/ml.
4,101,498

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.05	0.16	1.0	0.00	0.22	162
BOTT.	0.09	0.15	0.6	0.24	0.23	163

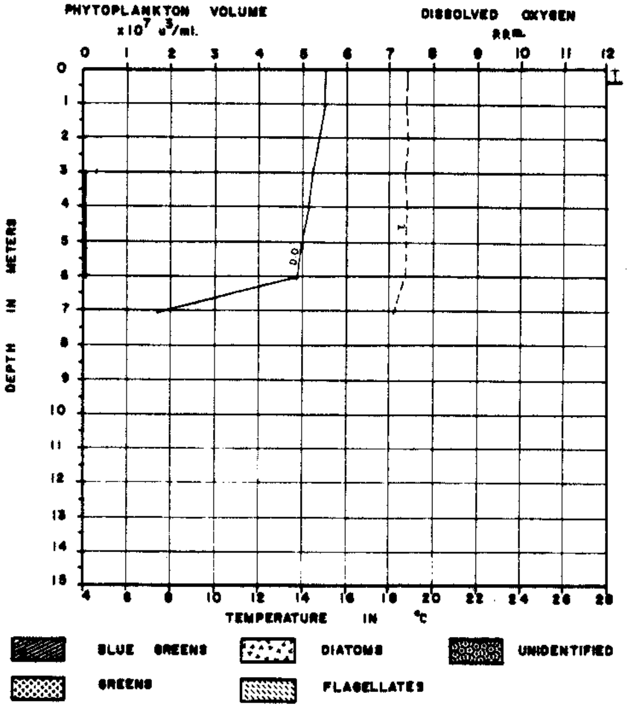


CLEAR LAKE STA. I

DATE 10-14-71

AVG. u^3/ml. 377,861

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.18	0.23	0.8	0.00	0.56	139
BOTT.	0.20	0.24	0.8	0.00	0.58	136

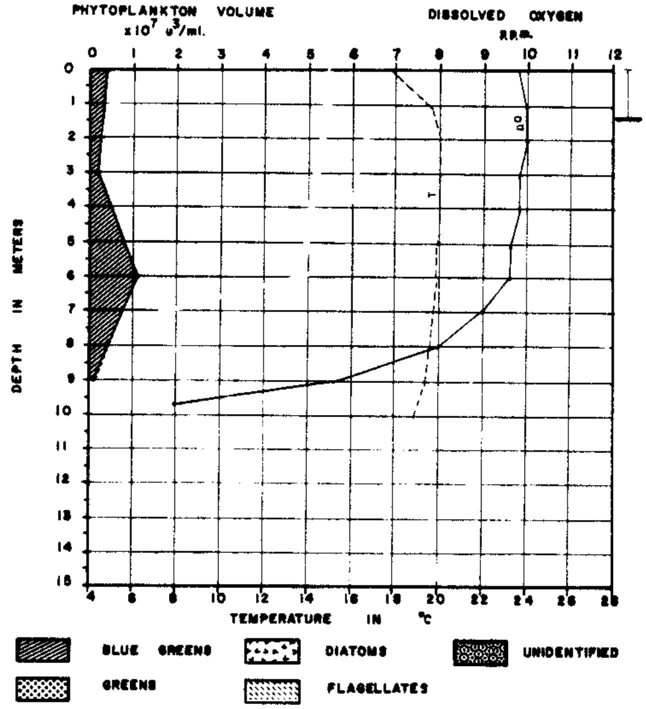


CLEAR LAKE STA. 3

DATE 10-14-71

AVG. u^3/ml. 5,352,389

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.09	1.3	0.03	0.11	140
BOTT.	0.00	0.09	0.7	0.09	0.20	139

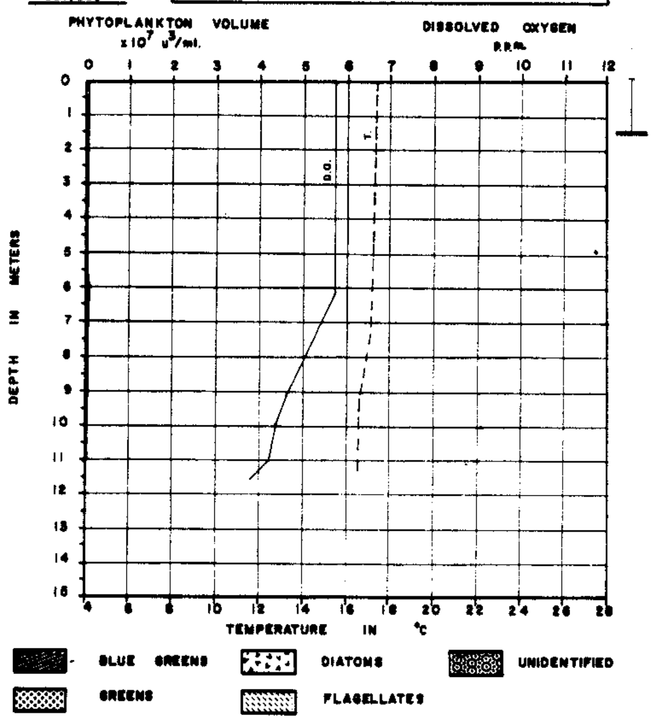


CLEAR LAKE STA. 4

DATE 10-14-71

AVG. u^3/ml. 687,050

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.09	0.13	0.6	0.00	0.67	136
BOTT.	0.10	0.14	0.6	0.00	0.71	135

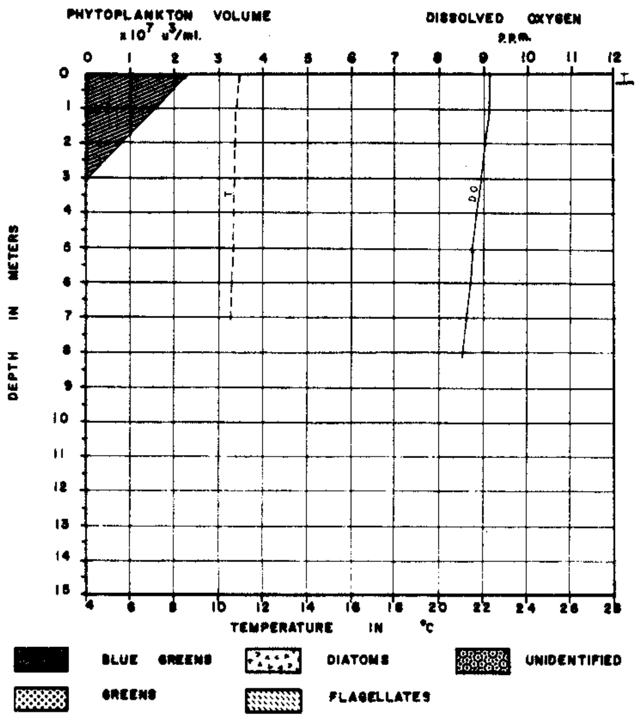


CLEAR LAKE STA. 1

DATE 11-16-71

AVG. u^3/ml. 4,716,922

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.09	0.14	0.7	0.30	0.81	145
BOTT.	0.09	0.14	0.6	0.32	0.47	141

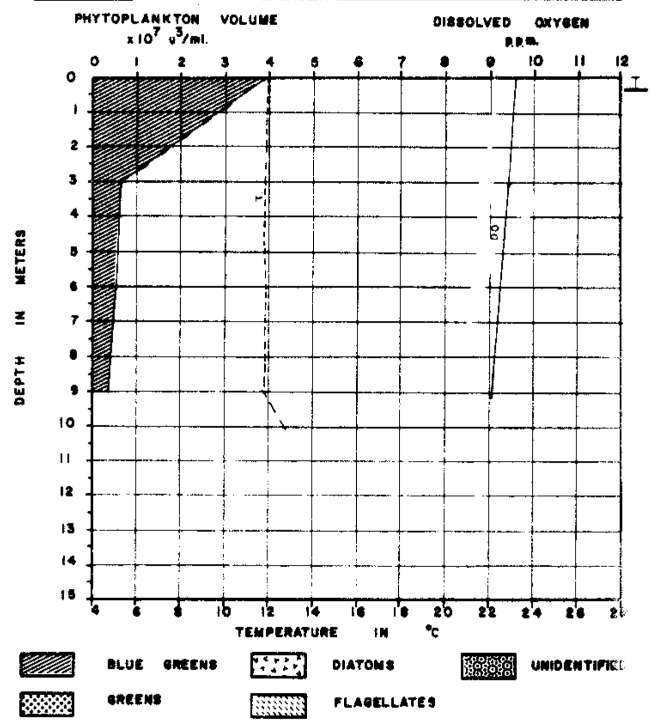


CLEAR LAKE STA. 3

DATE 11-16-71

AVG. u^3/ml. 11,249,658

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.07	1.0	0.24	0.26	132
BOTT.	0.00	0.05	0.6	0.24	0.28	147

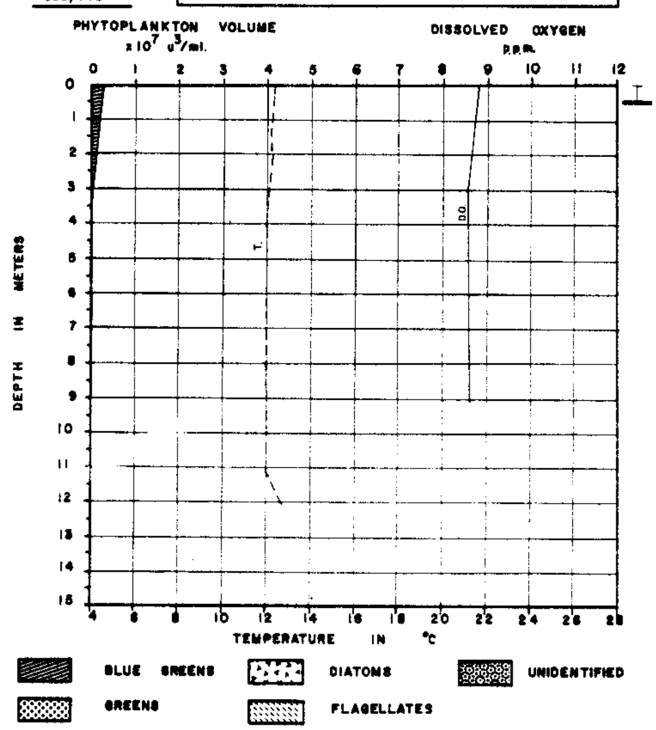


CLEAR LAKE STA. 4

DATE 11-16-71

AVG. u^3/ml. 650,446

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.10	0.7	0.32	0.48	141
BOTT.	0.04	0.09	0.6	0.32	0.47	133

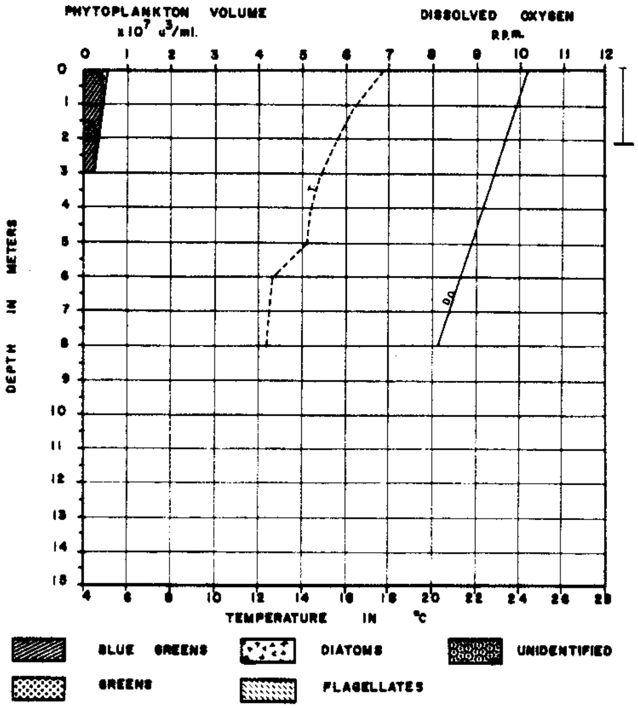


CLEAR LAKE STA. 1

DATE 3-16-72

AVG. u^3/ml. 227,059

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.03	0.4	0.00	0.63	128
BOTT.	0.02	0.06	0.4	0.02	0.68	129

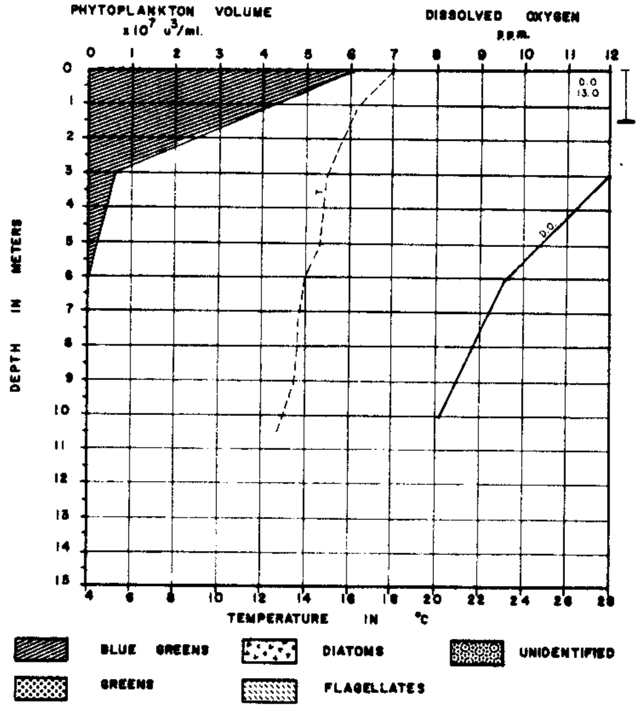


CLEAR LAKE STA. 3

DATE 3-16-72

AVG. u^3/ml. 13,061,127

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.08	1.0	0.00	0.27	153
BOTT.	0.01	0.06	0.5	0.16	0.31	140

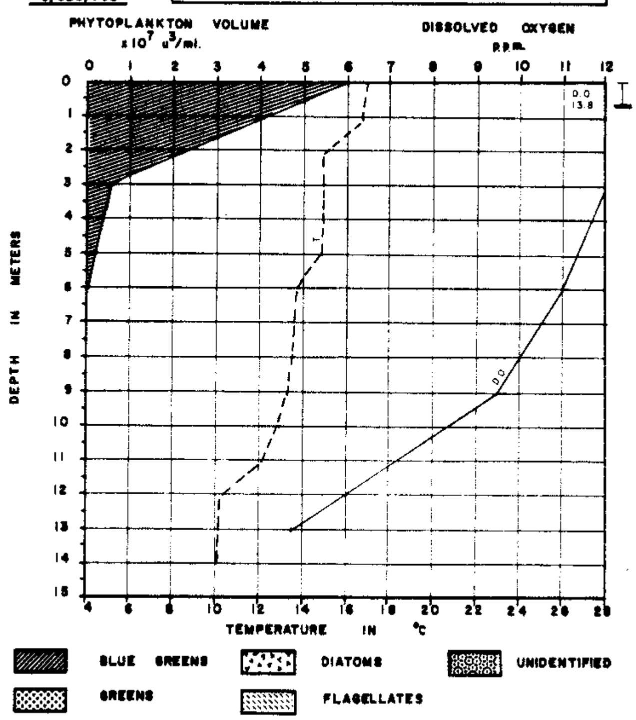


CLEAR LAKE STA. 4

DATE 3-16-72

AVG. u^3/ml. 8,329,796

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.06	2.0	0.00	0.38	137
BOTT.	0.02	0.06	0.5	0.27	0.33	138

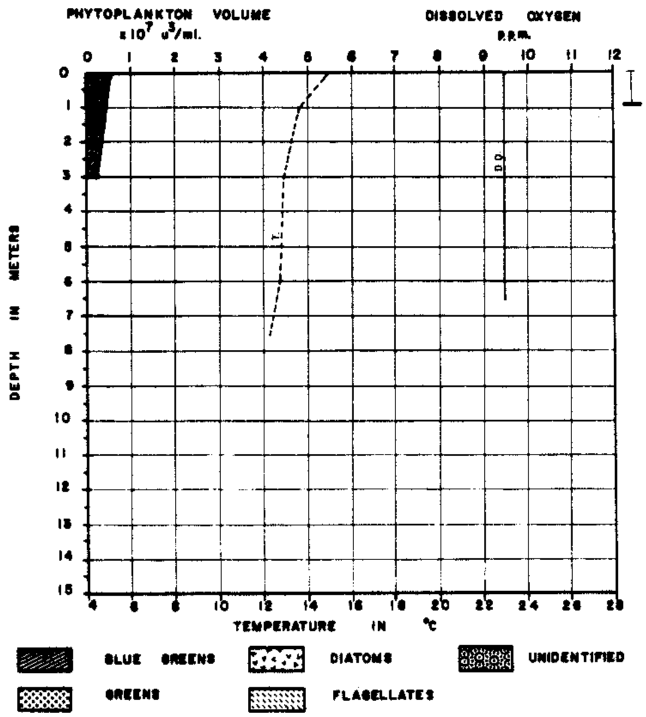


CLEAR LAKE STA. 1

DATE 3-30-72

AVG. u^3/ml. 2,627,690

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.04	0.5	0.01	0.55	136
BOTT.	0.01	0.04	0.4	0.01	0.57	

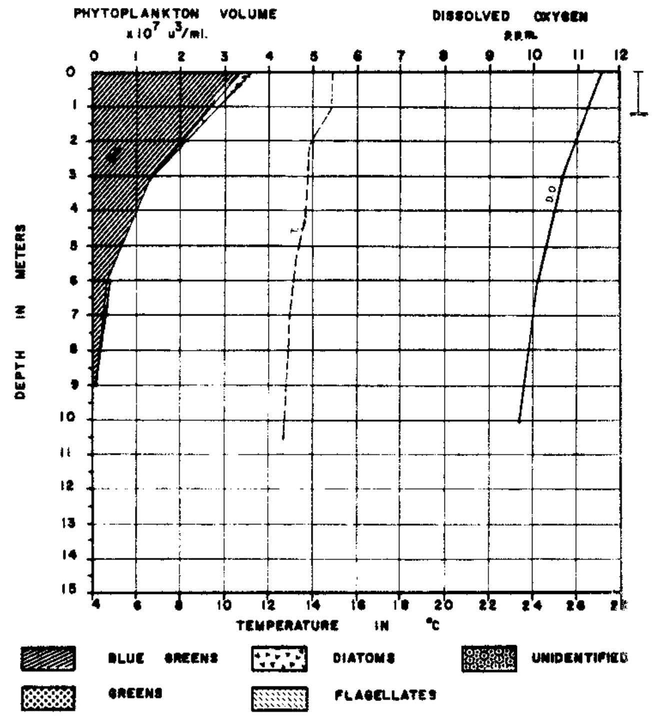


CLEAR LAKE STA. 3

DATE 3-30-72

AVG. u^3/ml. 16,112,121

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.06	1.1	0.01	0.16	142
BOTT.	0.00	0.04	0.5	0.01	0.18	

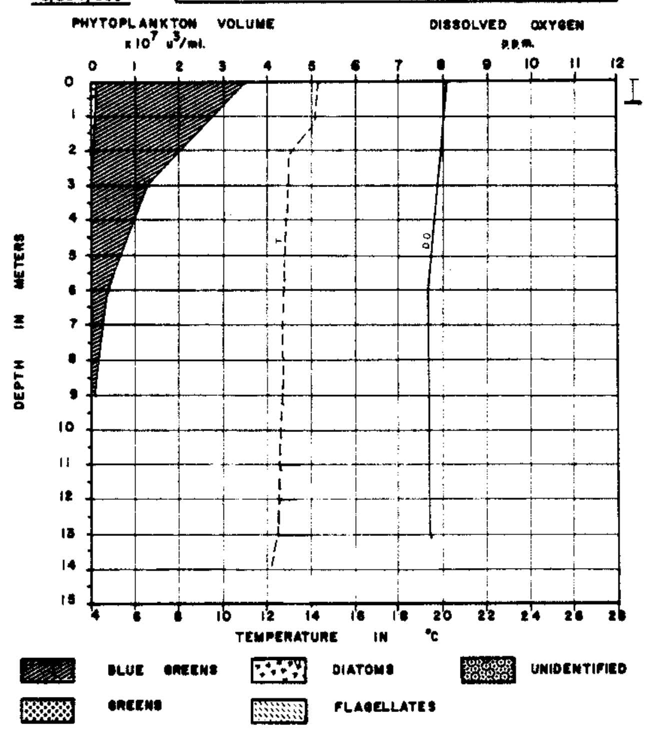


CLEAR LAKE STA. 4

DATE 3-30-72

AVG. u^3/ml. 6,264,680

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.06	1.1	0.00	0.35	134
BOTT.	0.01	0.06	0.5	0.05	0.41	

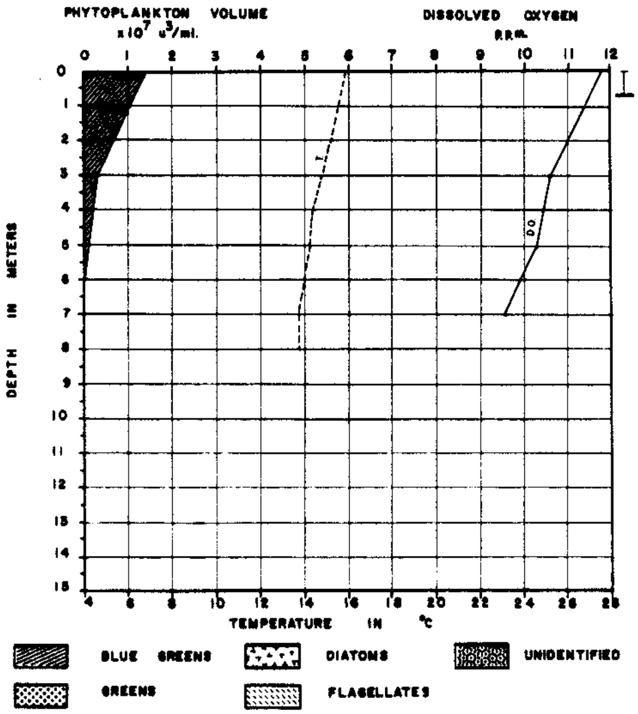


CLEAR LAKE STA. 1

DATE 4-17-72

AVG. u^3/ml. 11,847,140

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.08	1.2	0.00	0.41	119
BOTT.	0.01	0.04	0.5	0.06	0.46	114

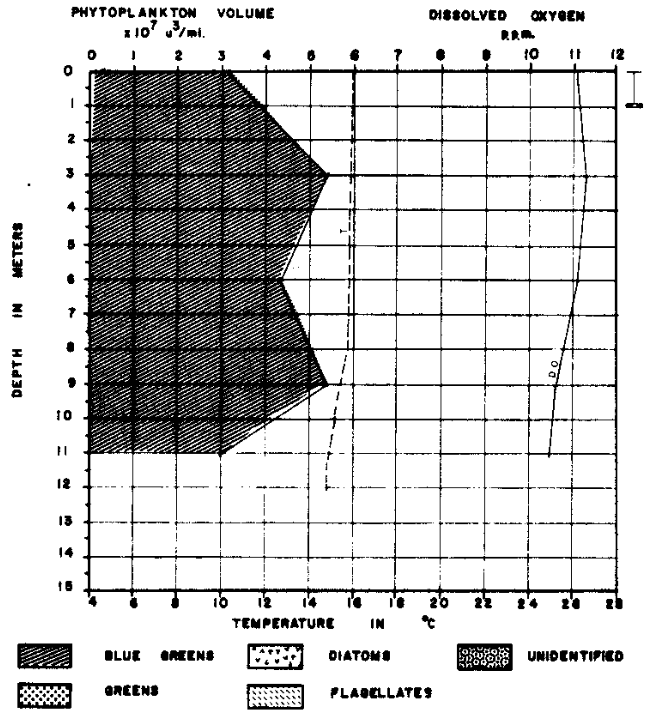


CLEAR LAKE STA. 3

DATE 4-17-72

AVG. u^3/ml. 44,824,657

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.07	1.7	0.00	0.05	130
BOTT.	0.00	0.05	0.6	0.01	0.08	128

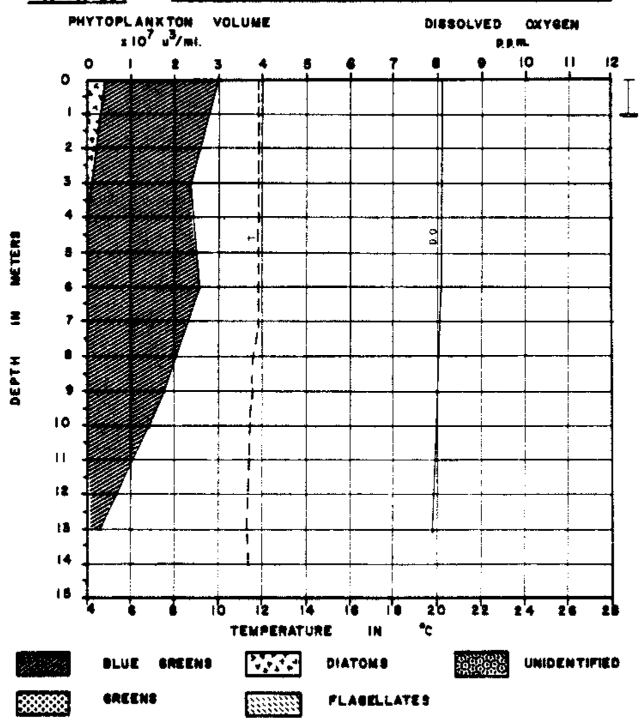


CLEAR LAKE STA. 4

DATE 4-17-72

AVG. u^3/ml. 19,793,722

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.05	0.9	0.01	0.29	121
BOTT.	0.01	0.04	0.6	0.02	0.25	123

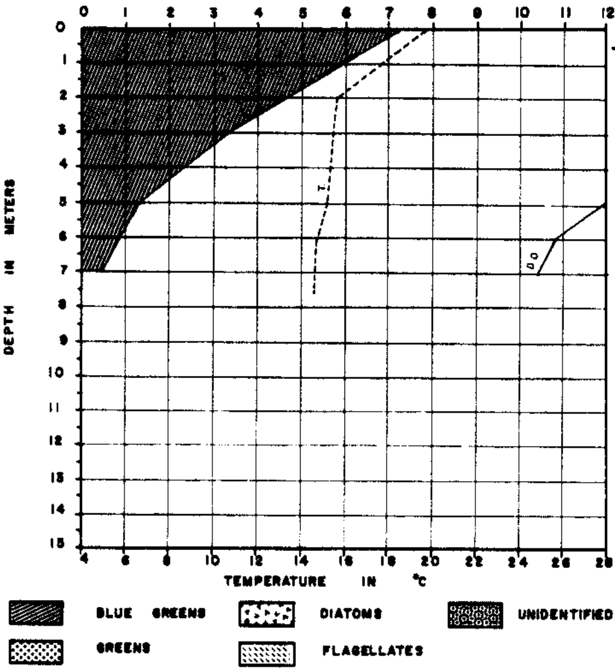


CLEAR LAKE STA. 1

DATE 4-27-72

AVG. u^3/ml.
27,416,572

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.08	1.4	0.36	0.00	118
BOTT.	0.01	0.04	0.4	0.04	0.28	118

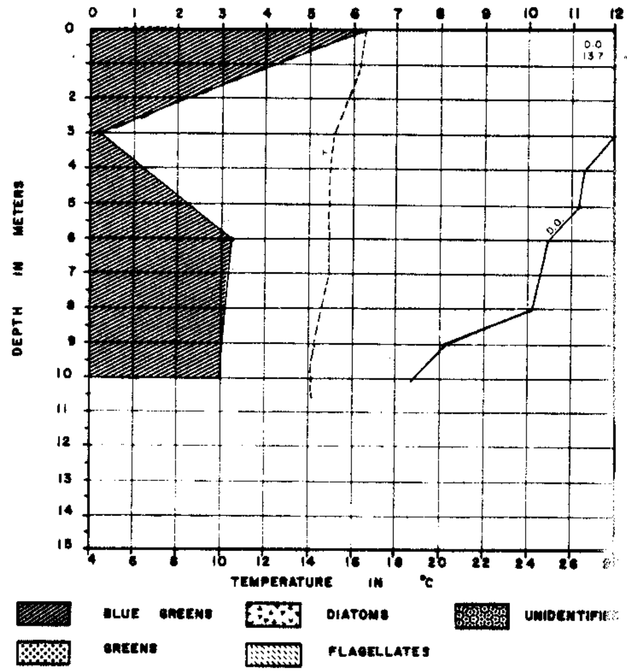


CLEAR LAKE STA. 3

DATE 4-27-72

AVG. u^3/ml
27,551,122

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.16	2.1	0.63	0.00	128
BOTT.	0.01	0.04	0.6	0.08	0.01	127

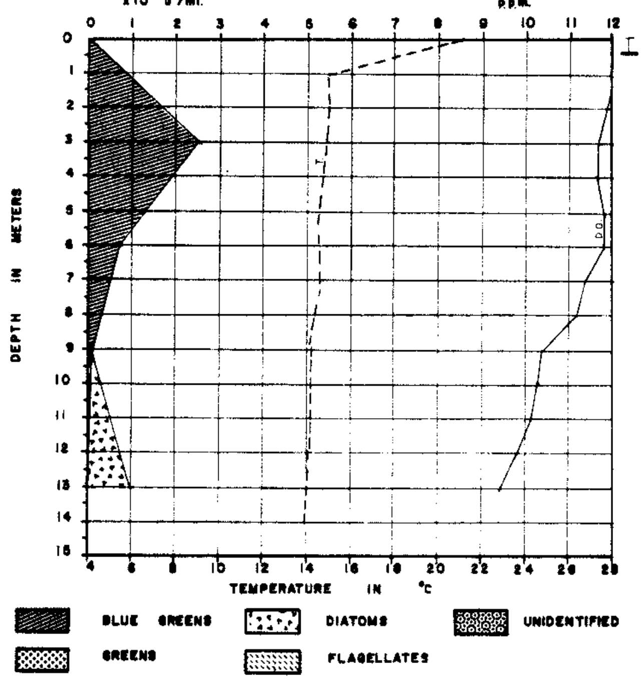


CLEAR LAKE STA. 4

DATE 4-27-72

AVG. u^3/ml.
32,011,381

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.24	2.6	0.92	0.01	122
BOTT.	0.00	0.03	0.4	0.00	0.00	124

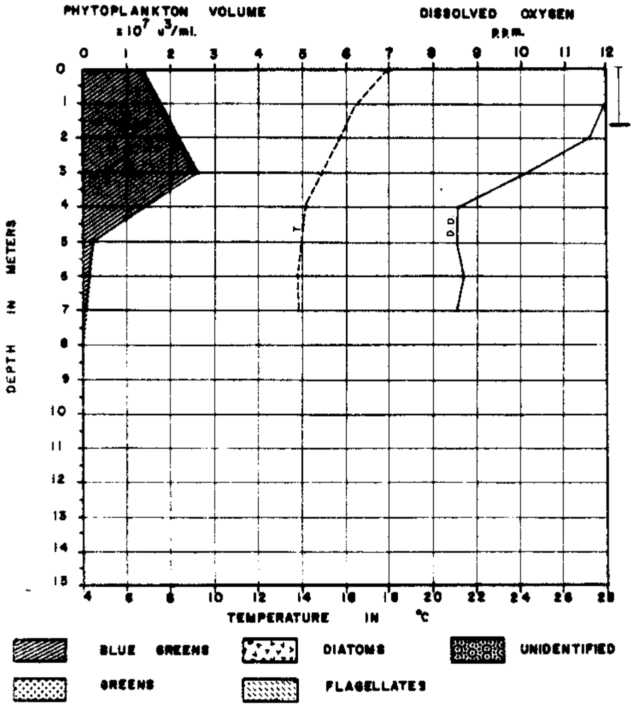


CLEAR LAKE STA. 1

DATE 6-6-72

AVG. u^3/ml. 12,086,606

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.02	0.7	0.01	0.00	116
BOTT.	0.00	0.02	0.4	0.03	0.07	118

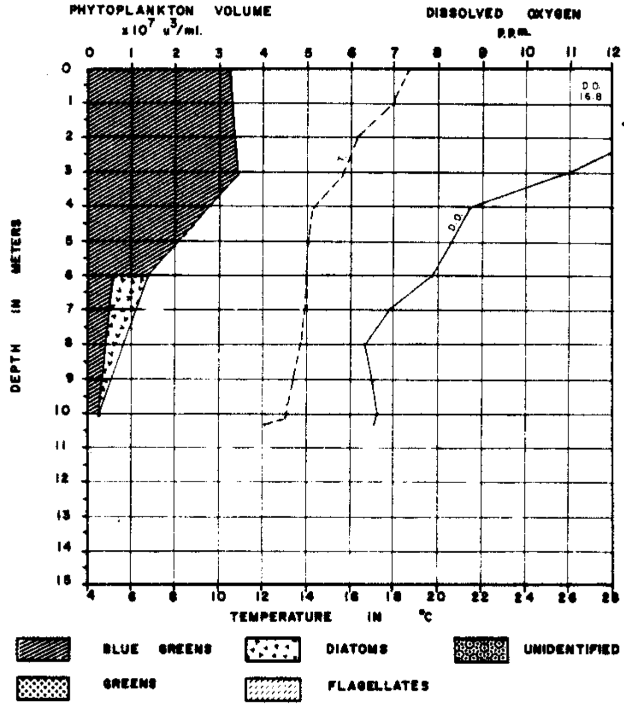


CLEAR LAKE STA. 3

DATE 6-6-72

AVG. u^3/ml. 21,204,100

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.03	0.8	0.01	0.02	125
BOTT.	0.02	0.06	1.0	0.28	0.01	127

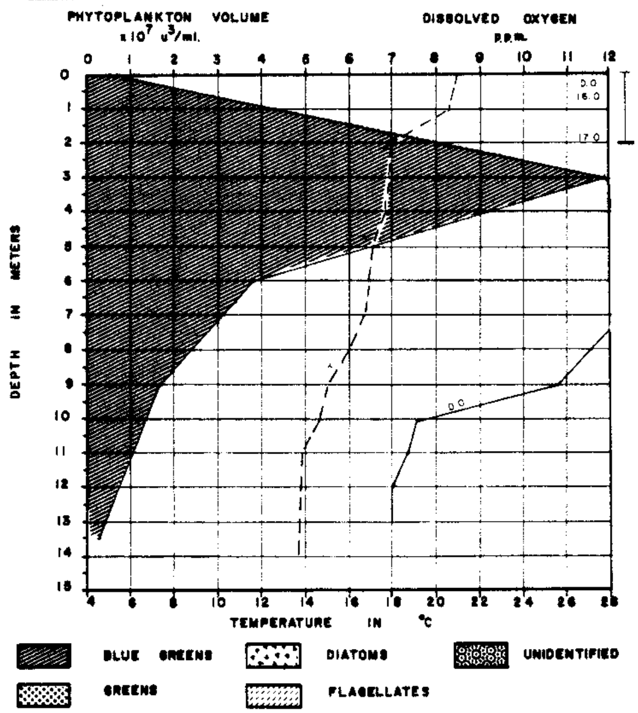


CLEAR LAKE STA. 4

DATE 6-6-72

AVG. u^3/ml. 41,474,054

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.02	0.8	0.02	0.00	120
BOTT.	0.03	0.07	0.6	0.19	0.02	125

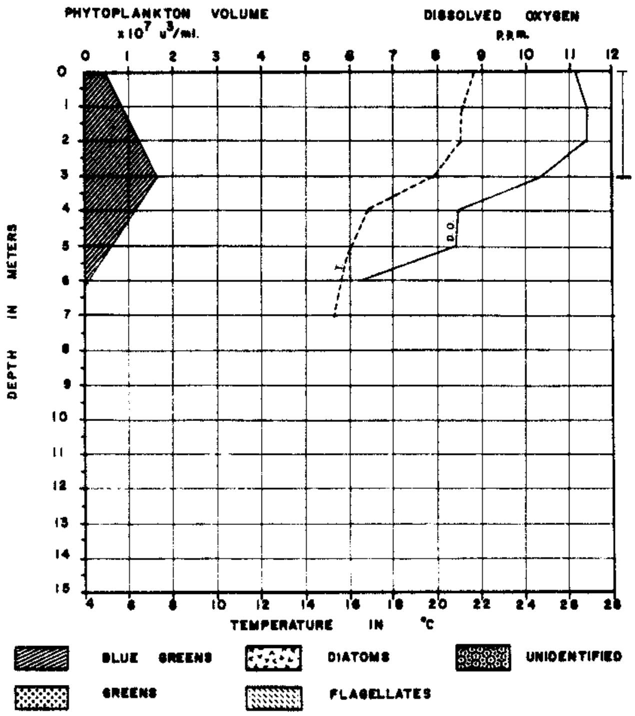


CLEAR LAKE STA. 1

DATE 6-16-72

AVG. u^3/ml. 9,034,525

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.02	0.4	0.00	0.00	122
BOTT.	0.02	0.03	0.4	0.04	0.04	121

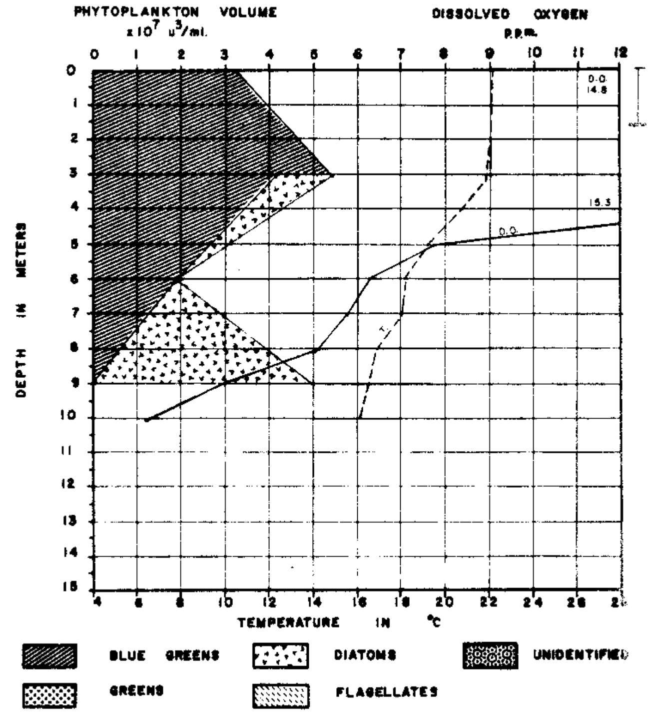


CLEAR LAKE STA. 3

DATE 6-16-72

AVG. u^3/ml. 37,486,009

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.04	0.9	0.19	0.00	129
BOTT.	0.02	0.05	0.5	0.26	0.00	138

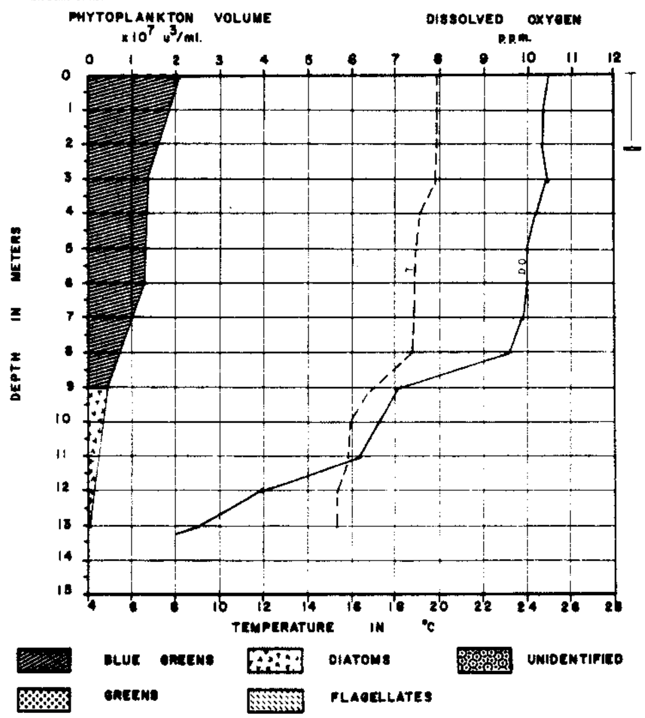


CLEAR LAKE STA. 4

DATE 6-16-72

AVG. u^3/ml. 10,808,973

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.02	0.3	0.18	0.00	122
BOTT.	0.20	0.24	0.5	0.54	0.00	131

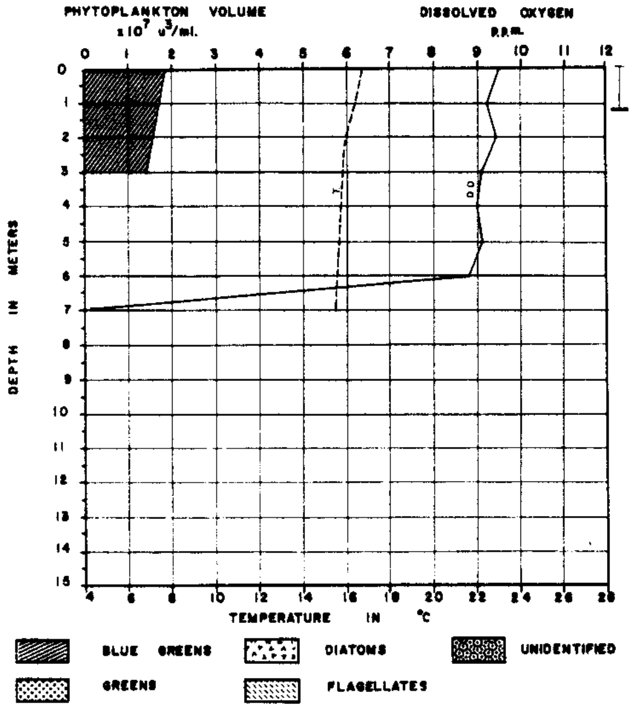


CLEAR LAKE STA. I

DATE 5-23-72

AVG. u^3/ml. 10,158,091

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.03	0.5	0.01	0.01	121
BOTT.	0.01	0.04	0.4	0.04	0.02	122

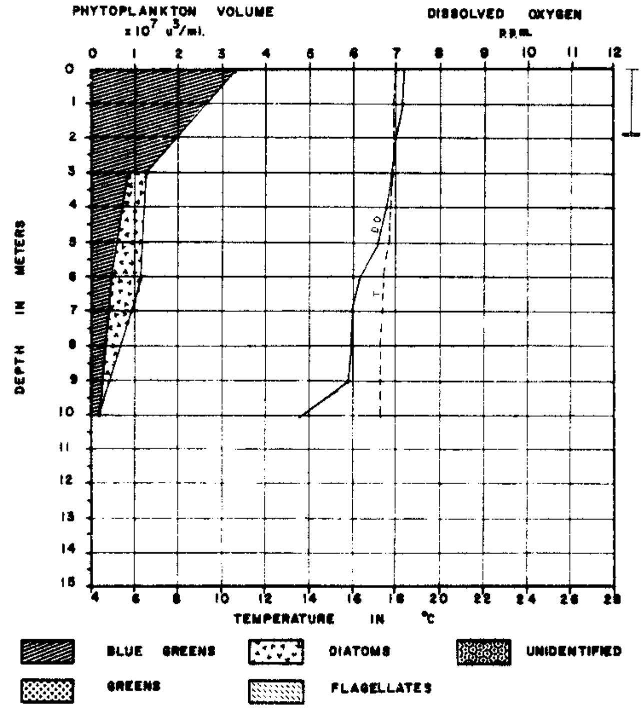


CLEAR LAKE STA. 3

DATE 5-23-72

AVG. u^3/ml. 9,264,533

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.04	0.7	0.36	0.06	129
BOTT.	0.04	0.08	0.8	0.48	0.08	128

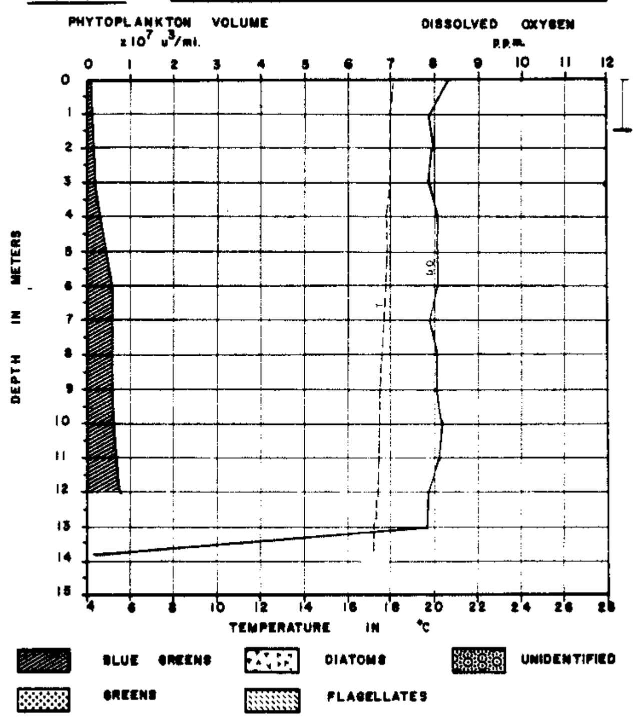


CLEAR LAKE STA. 4

DATE 5-23-72

AVG. u^3/ml. 5,371,522

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.06	0.6	0.24	0.01	123
BOTT.	0.07	0.07	0.6	0.22	0.05	123

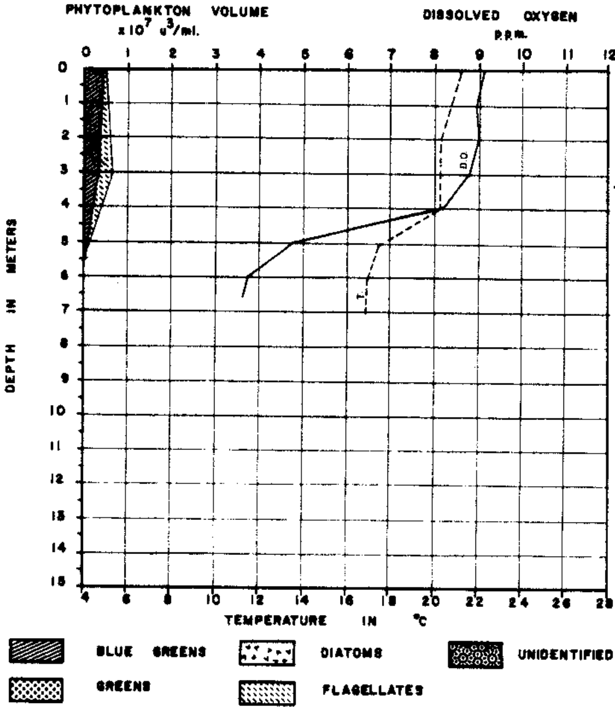


CLEAR LAKE STA. 1

DATE 6-3-72

AVG. u^3/ml.
3,823,183

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.01	0.5	0.01	0.01	119
BOTT.	0.02	0.06	0.4	0.04	0.08	120

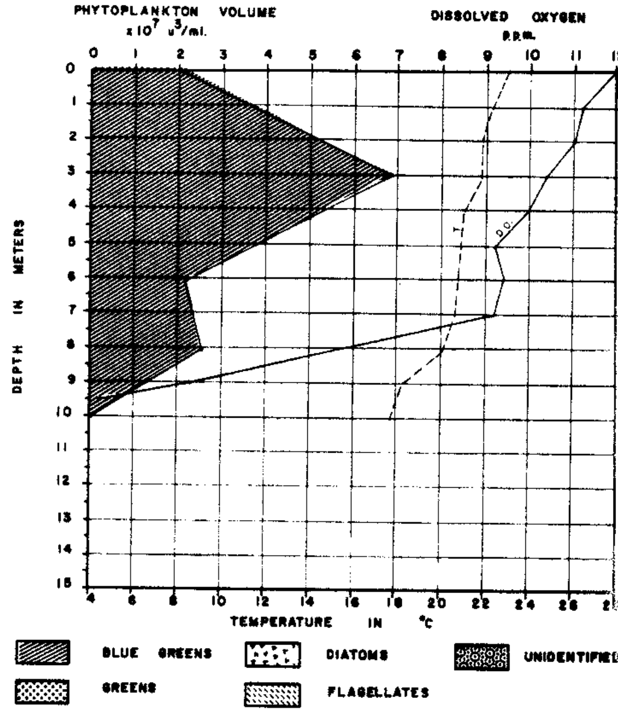


CLEAR LAKE STA. 3

DATE 6-3-72

AVG. u^3/ml.
35,060,077

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.04	0.9	0.01	0.01	126
BOTT.	0.30	0.32	1.1	0.73	0.04	131

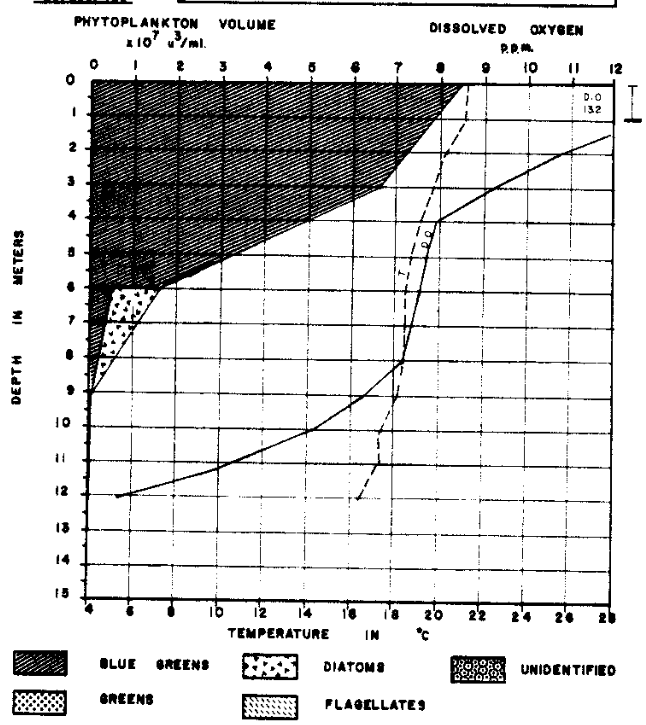


CLEAR LAKE STA. 4

DATE 6-3-72

AVG. u^3/ml.
29,259,405

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.09	1.6	0.00	0.01	123
BOTT.	0.16	0.18	0.5	0.44	0.01	126

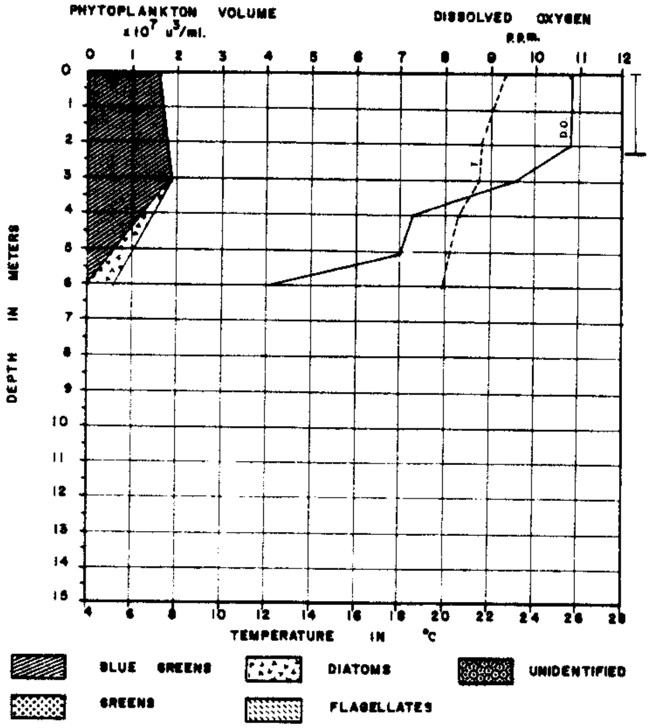


CLEAR LAKE STA. 1

DATE 6-13-72

AVG. u^3/ml. 14,666,406

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.06	0.7	0.00	0.05	120
BOTT.	0.03	0.04	0.3	0.07	0.10	123

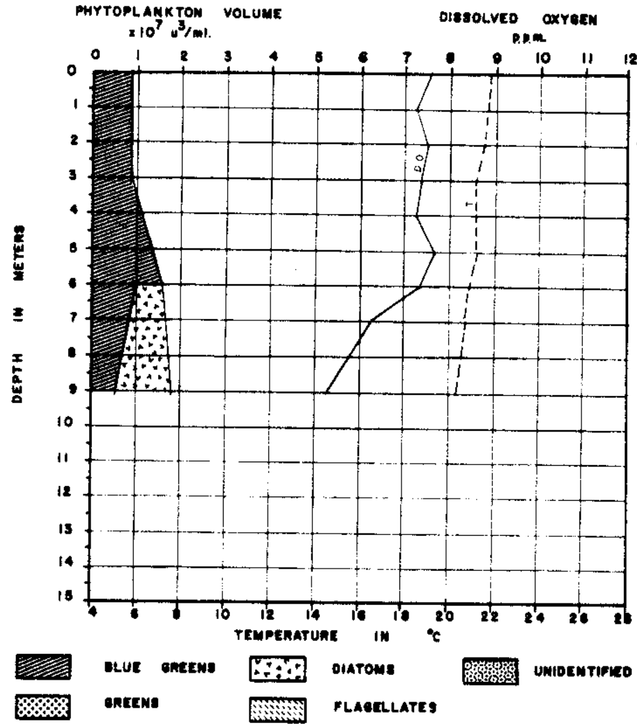


CLEAR LAKE STA. 3

DATE 6-13-72

AVG. u^3/ml. 13,004,465

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.06	0.7	0.24	0.01	130
BOTT.	0.03	0.07	0.6	0.34	0.09	131

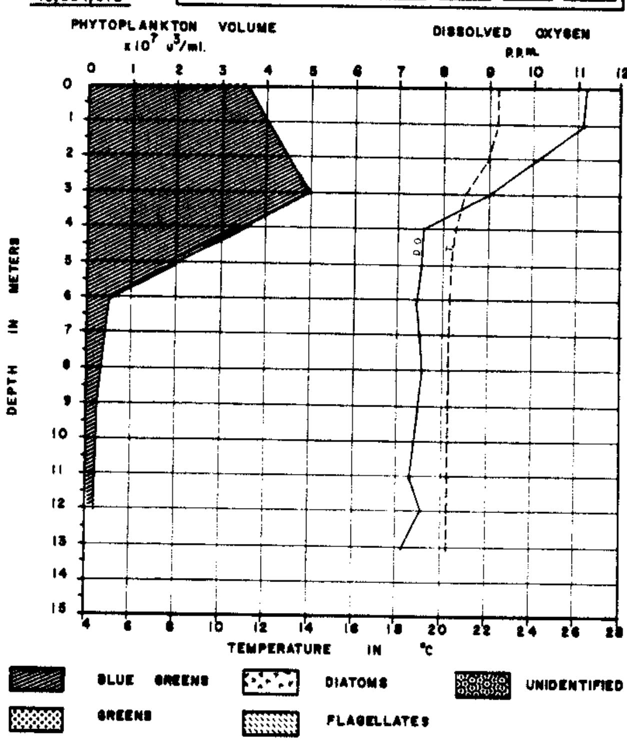


CLEAR LAKE STA. 4

DATE 6-13-72

AVG. u^3/ml. 18,364,372

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.10	1.0	0.00	0.01	127
BOTT.	0.06	0.07	0.6	0.10	0.08	125

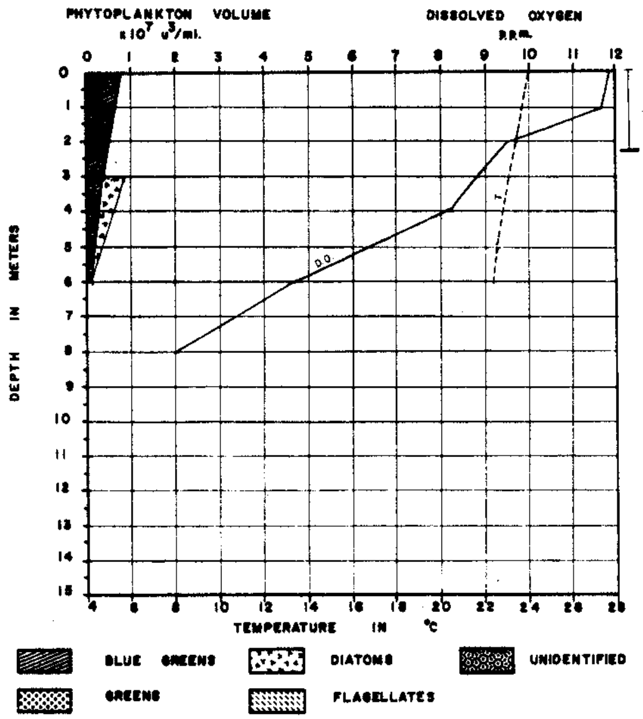


CLEAR LAKE STA. 1

DATE 6-22-72

AVG. u^3/ml. 6,462,803

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.04	0.6	0.00	0.00	121
BOTT.	0.09	0.09	0.4	0.06	0.12	127

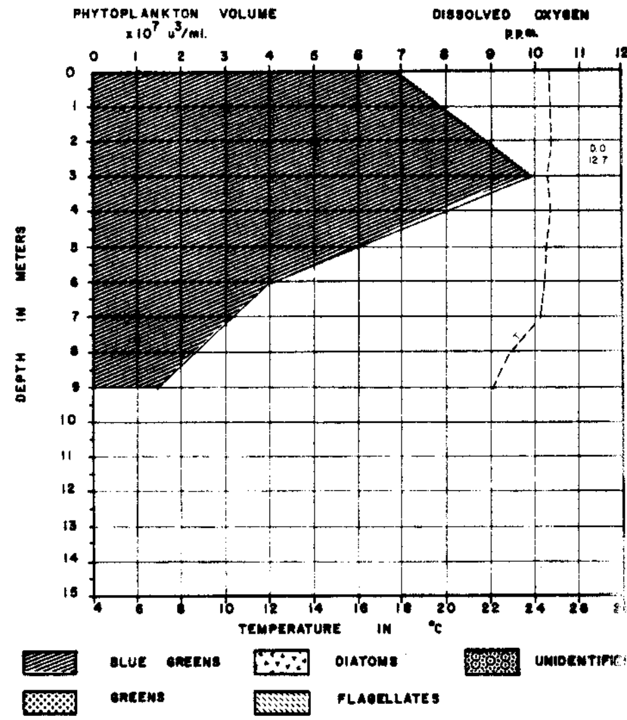


CLEAR LAKE STA. 3

DATE 6-22-72

AVG. u^3/ml. 55,481,966

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.13	0.17	0.8	0.60	0.01	131
BOTT.	0.00	0.09	1.4	0.26	0.01	131

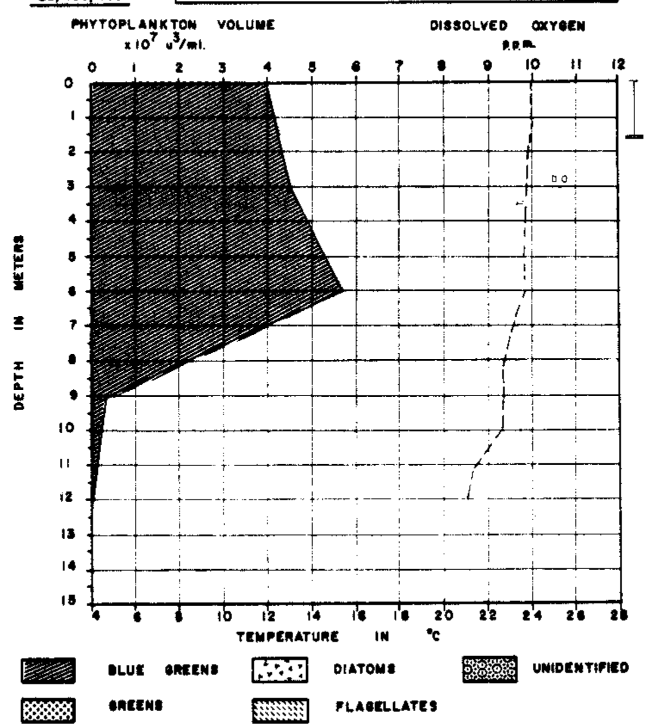


CLEAR LAKE STA. 4

DATE 6-22-72

AVG. u^3/ml. 29,499,499

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.07	1.1	0.09	0.01	127
BOTT.	0.21	0.25	0.6	0.47	0.06	126

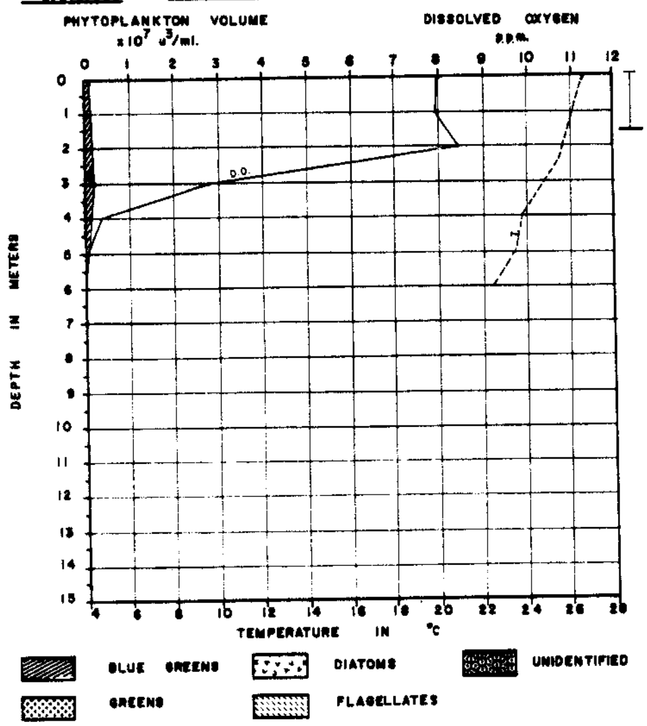


CLEAR LAKE STA. 1

DATE 7-6-72

AVG. u^3/ml. 2,072,308

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.04	0.5	0.02	0.03	128
BOTT.	0.29	0.42	0.4	0.29	0.02	129

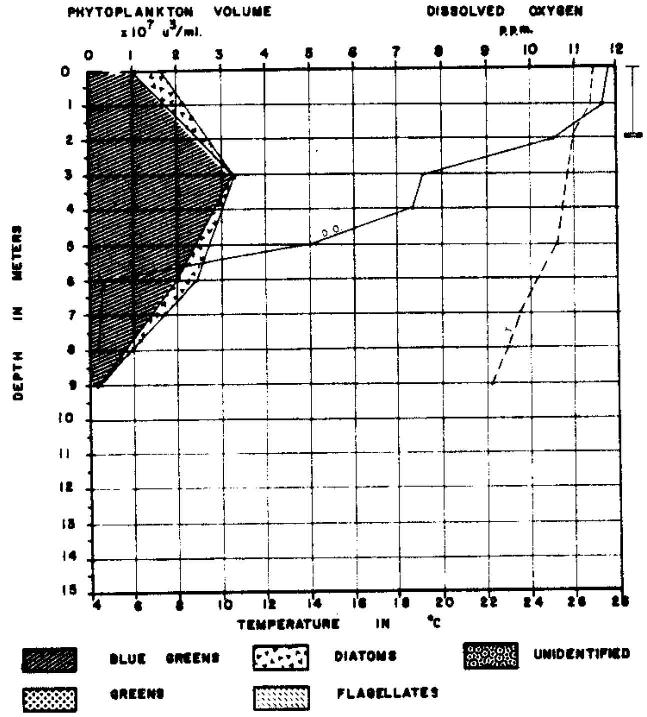


CLEAR LAKE STA. 3

DATE 7-6-72

AVG. u^3/ml. 21,949,863

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.06	0.8	0.10	0.03	132
BOTT.	0.14	0.30	0.5	0.92	0.02	136

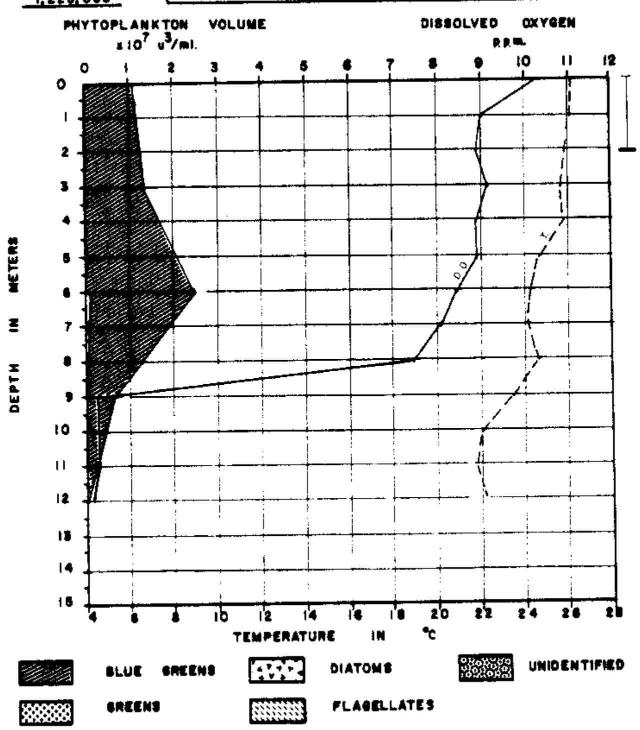


CLEAR LAKE STA. 4

DATE 7-6-72

AVG. u^3/ml. 1,223,066

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.05	0.6	0.09	0.02	127
BOTT.	0.32	0.46	0.6	0.79	0.02	133

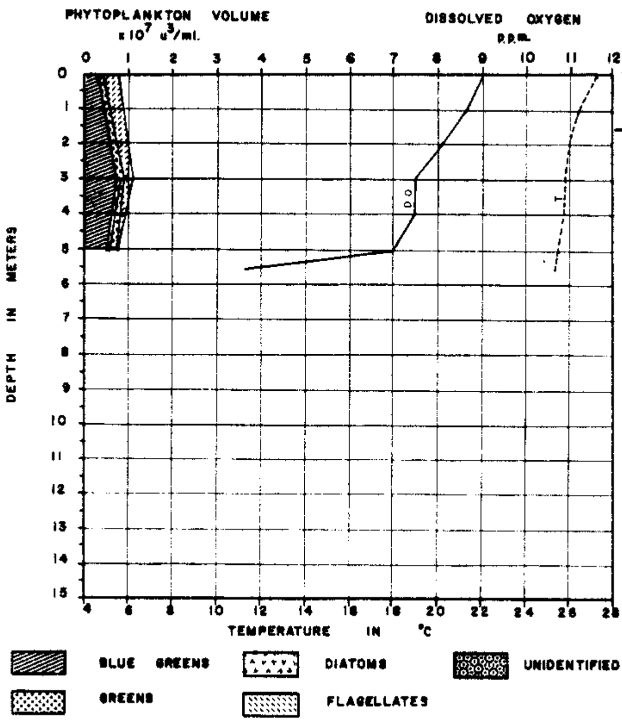


CLEAR LAKE STA. I

DATE 7-27-72

AVG. u^3/ml.
9,456,650

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.19	0.20	0.7	0.00	0.02	131
BOTT.	0.20	0.21	0.6	0.00	0.02	133

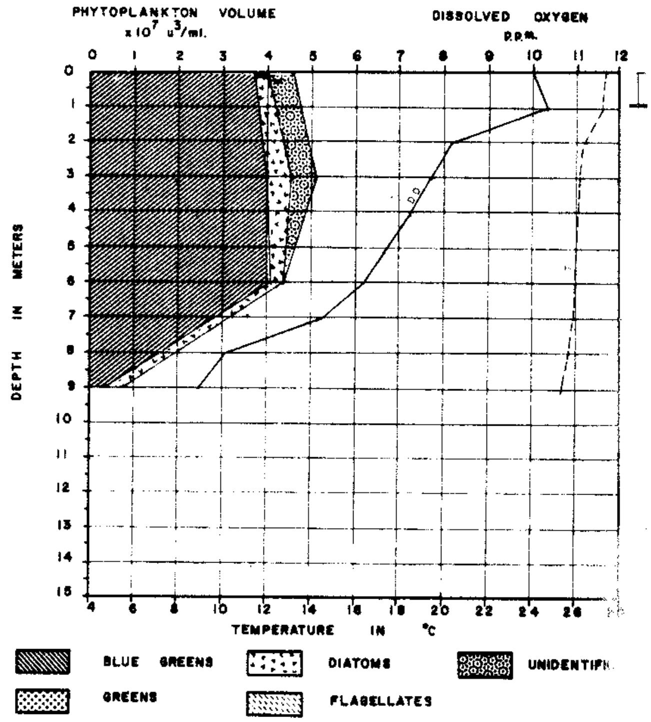


CLEAR LAKE STA. 3

DATE 7-27-72

AVG. u^3/ml.
41,071,326

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.06	1.0	0.00	0.01	134
BOTT.	0.08	0.12	0.8	0.38	0.02	134

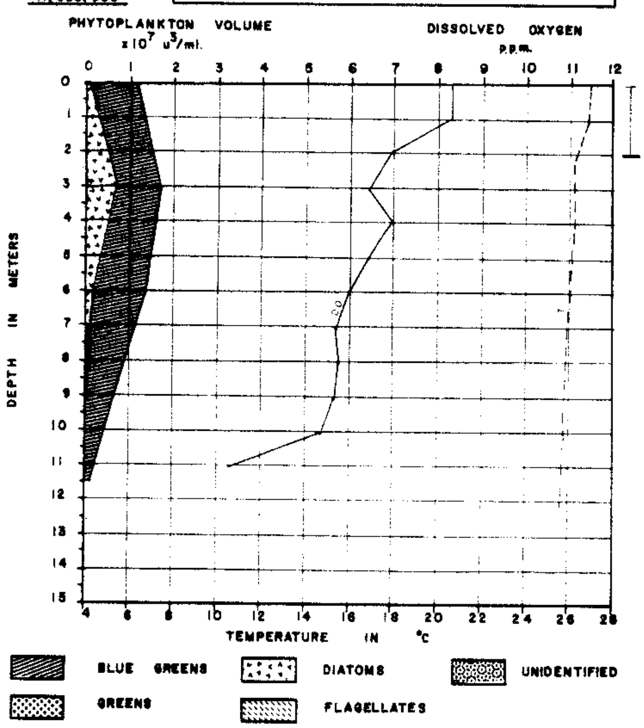


CLEAR LAKE STA. 4

DATE 7-27-72

AVG. u^3/ml.
11,620,903

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.09	0.7	0.00	0.00	130
BOTT.	0.12	0.14	0.5	0.11	0.02	132

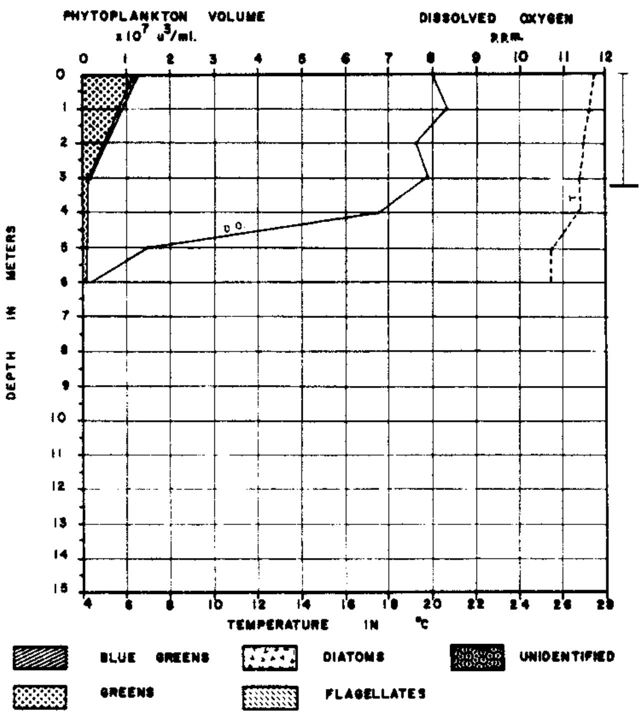


CLEAR LAKE STA. 1

DATE 8-9-72

AVG. u^3/ml
5,470,401

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.20	0.22	0.3	0.00	0.02	136
BOTT.	0.46	0.47	0.6	0.31	0.01	136

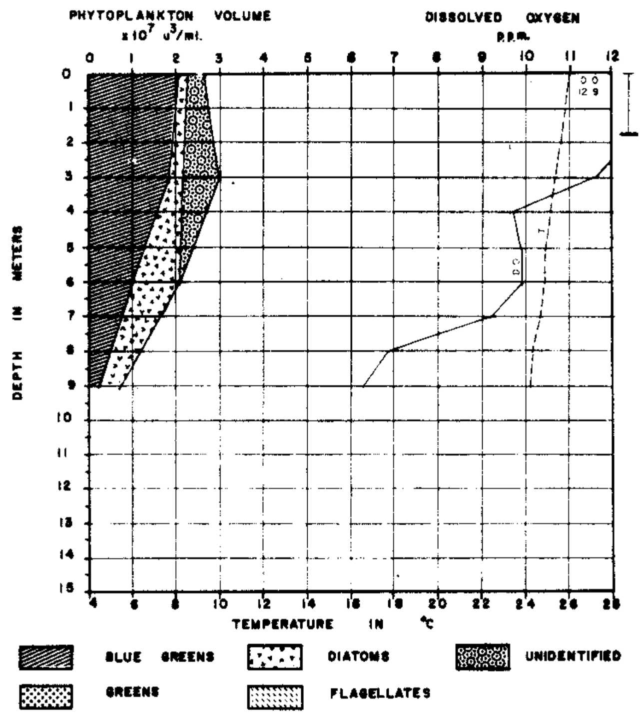


CLEAR LAKE STA. 3

DATE 8-9-72

AVG. u^3/ml.
23,189,874

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.11	0.9	0.02	0.00	134
BOTT.	0.07	0.10	0.7	0.11	0.02	136

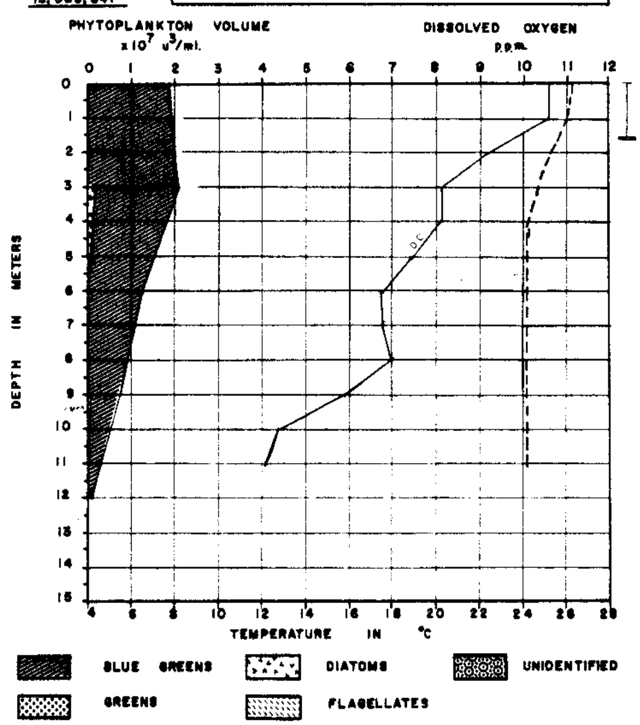


CLEAR LAKE STA. 4

DATE 8-9-72

AVG. u^3/ml.
13,389,847

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.16	0.8	0.13	0.00	133
BOTT.	0.13	0.21	0.6	0.32	0.01	132

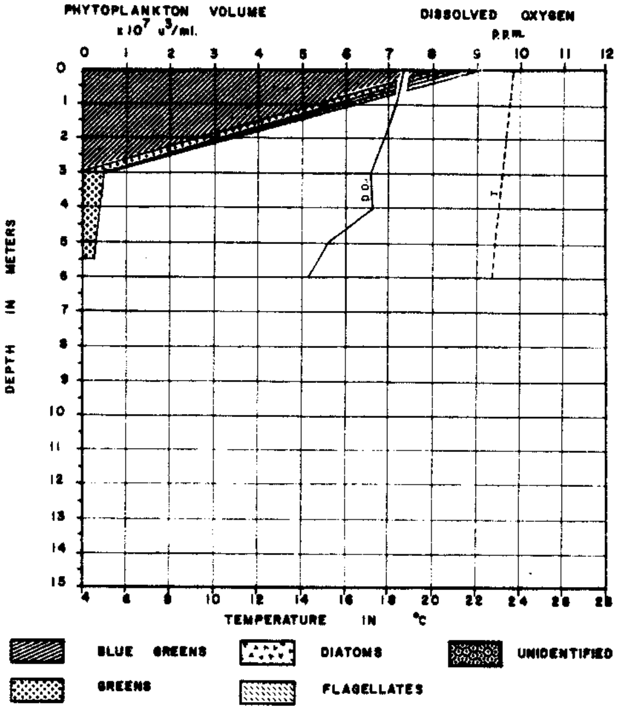


CLEAR LAKE STA. 1

DATE 8-18-72

AVG. u^3/ml.
7,396,647

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.21	0.23	0.6	0.02	0.02	136
BOTT.	0.20	0.22	0.6	0.09	0.01	137

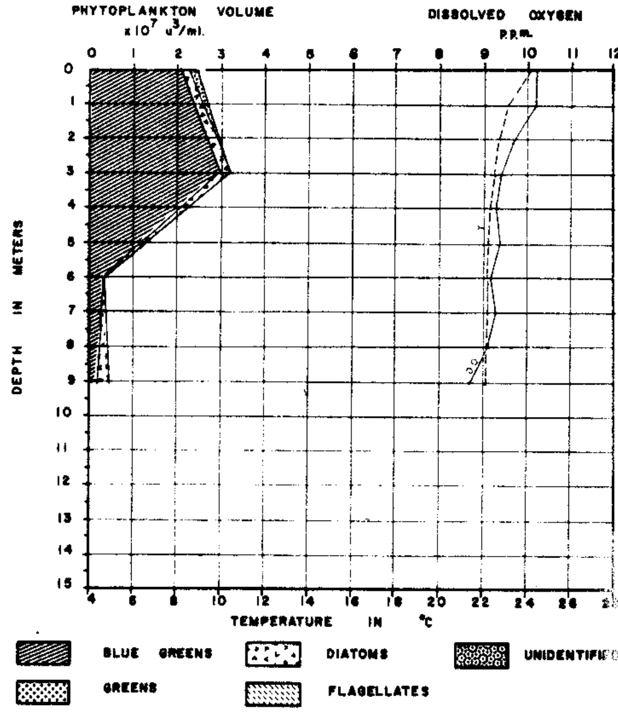


CLEAR LAKE STA. 3

DATE 8-18-72

AVG. u^3/ml.
17,749,356

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.14	0.1	0.07	0.02	139
BOTT.	0.02	0.08	0.8	0.14	0.01	136

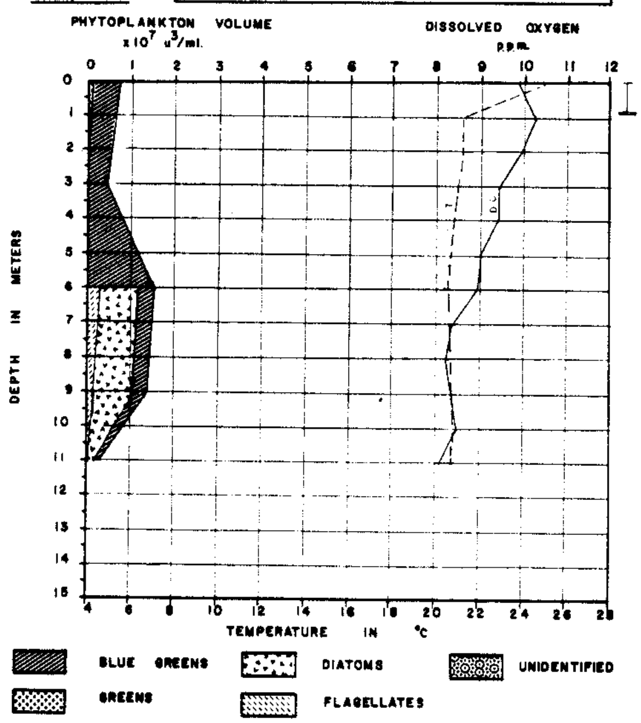


CLEAR LAKE STA. 4

DATE 8-18-72

AVG. u^3/ml.
999,037

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.08	0.16	0.7	0.18	0.02	133
BOTT.	0.10	0.15	0.7	0.23	0.02	134

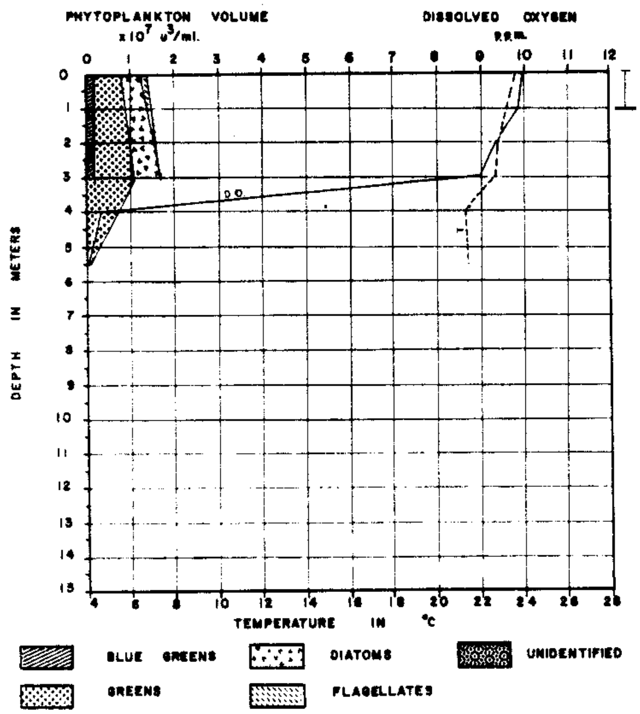


CLEAR LAKE STA. 1

DATE 8-30-72

AVG. u^3/ml. 11,981,482

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.09	0.16	0.6	0.03	0.02	131
BOTT.	0.27	0.44	0.8	0.02	0.17	134

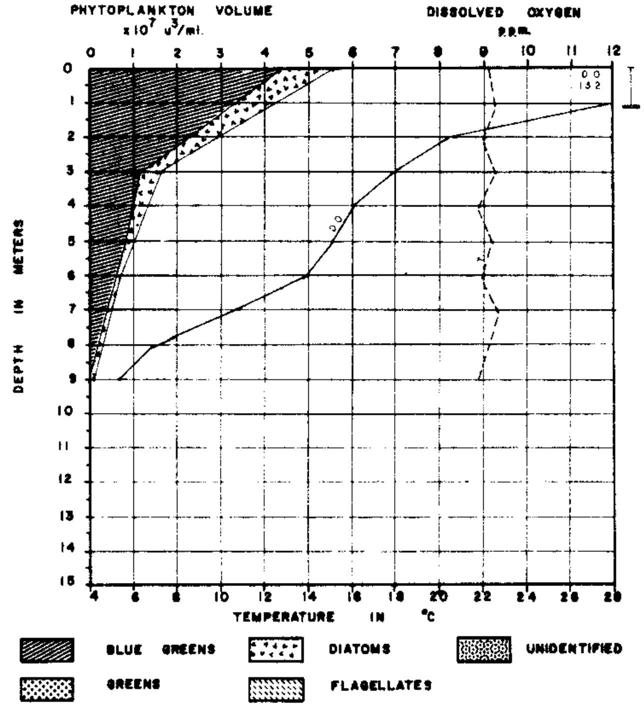


CLEAR LAKE STA. 3

DATE 8-30-72

AVG. u^3/ml. 17,422,076

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.07	0.08	1.4	0.03	0.06	138
BOTT.	0.10	0.13	0.6	0.02	0.35	138

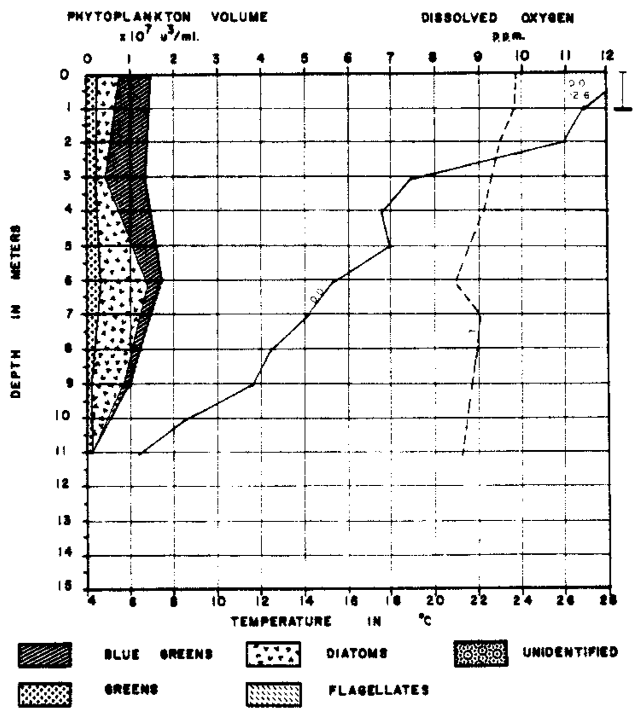


CLEAR LAKE STA. 4

DATE 8-30-72

AVG. u^3/ml. 12,852,474

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.05	0.12	0.7	0.01	0.01	135
BOTT.	0.14	0.16	0.0	0.17	0.14	132

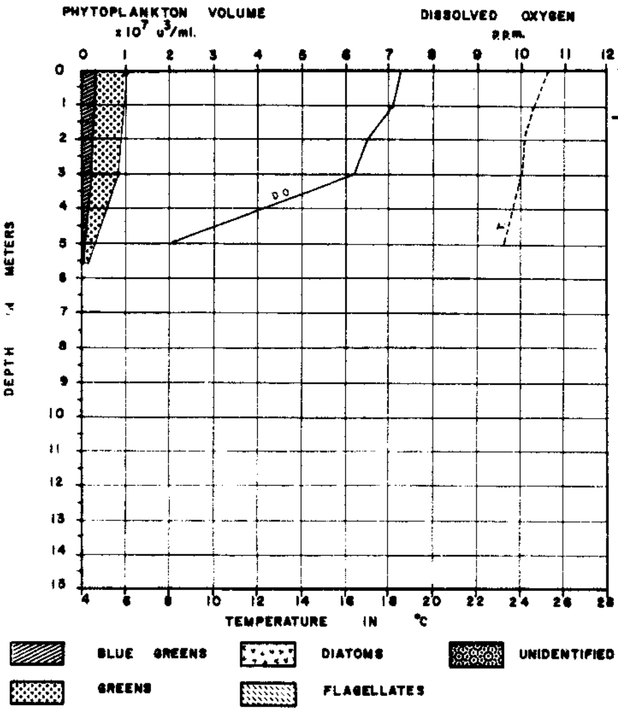


CLEAR LAKE STA. 1

DATE 9-6-72

AVG. u^3/ml. 8,545,636

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.17	0.29	0.7	0.01	0.13	141
BOTT.	0.14	0.30	0.6	0.00	0.06	148

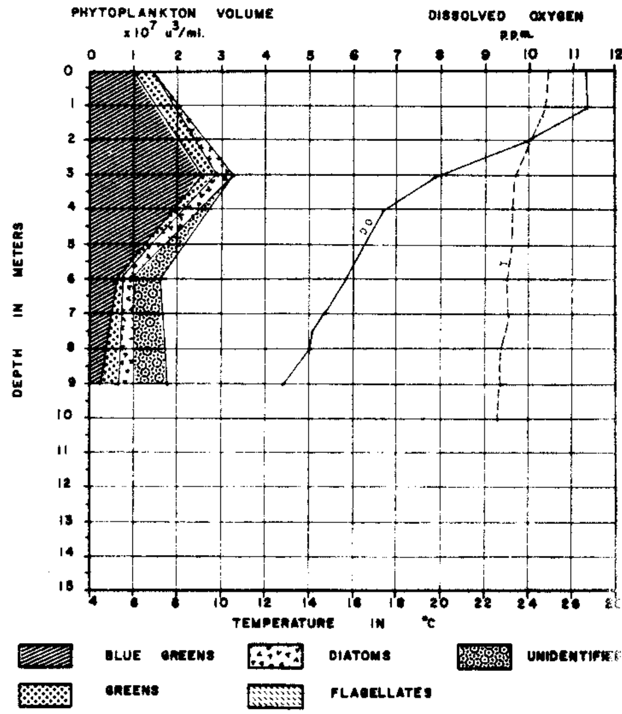


CLEAR LAKE STA. 3

DATE 9-6-72

AVG. u^3/ml. 22,271,701

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.12	1.1	0.01	0.02	146
BOTT.	0.05	0.12	1.0	0.07	0.03	144

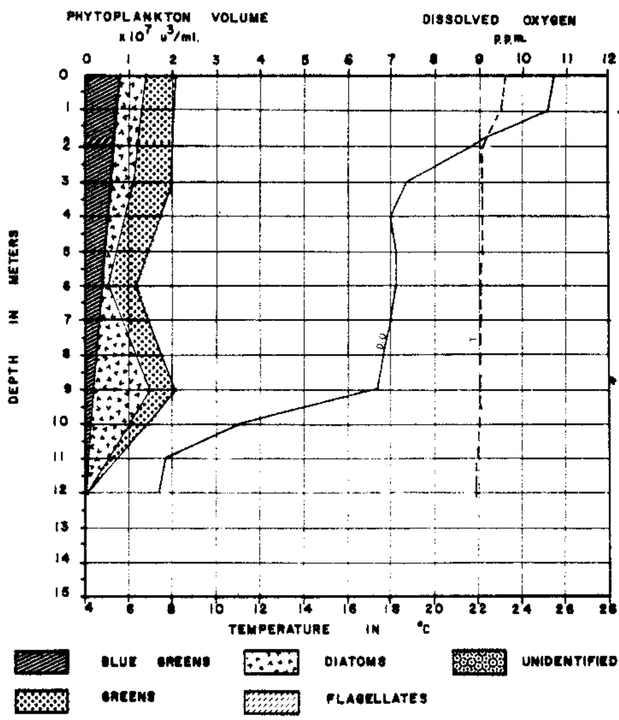


CLEAR LAKE STA. 4

DATE 9-6-72

AVG. u^3/ml. 16,180,569

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.16	1.0	0.03	0.00	140
BOTT.	0.06	0.18	0.8	0.11	0.03	139

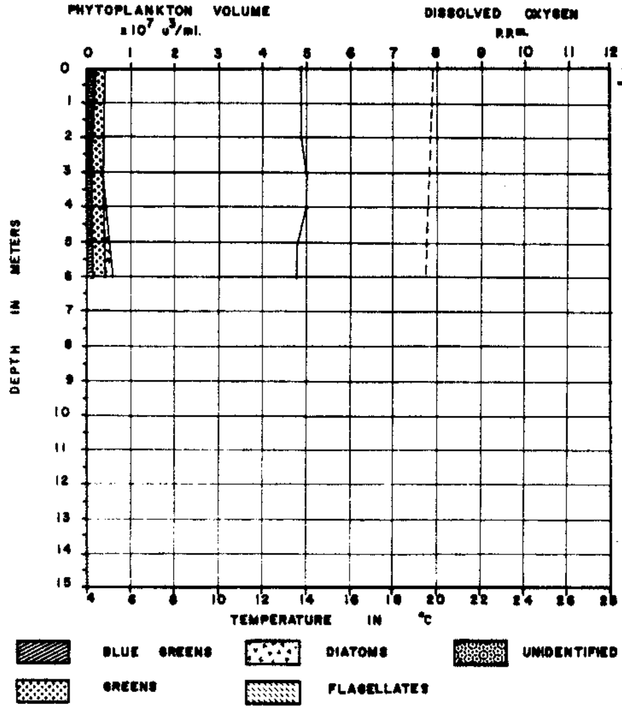


CLEAR LAKE STA. 1

DATE 9-19-72

AVG. u^3/ml. 5,248,759

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.21	0.22	0.6	0.00	0.02	142
BOTT.	0.30	0.36	0.6	0.18	0.00	141

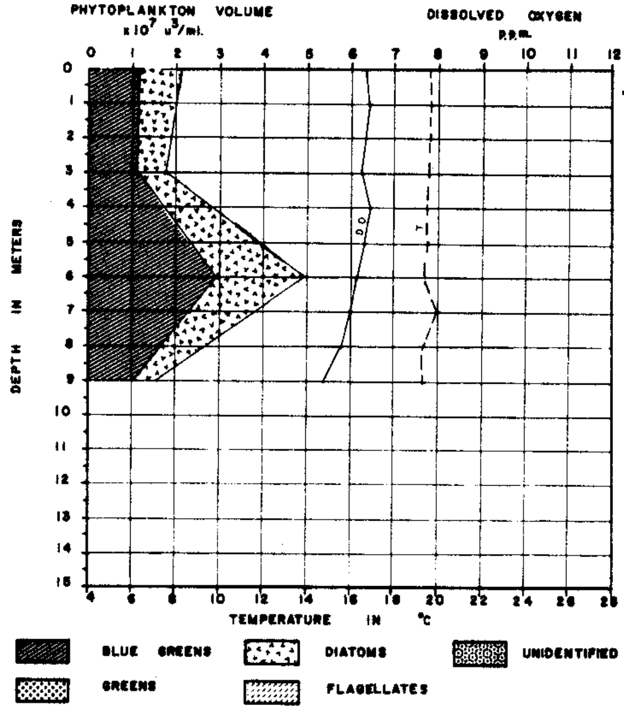


CLEAR LAKE STA. 3

DATE 9-19-72

AVG. u^3/ml. 29,280,338

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.12	1.0	0.00	0.00	143
BOTT.	0.06	0.13	0.9	0.18	0.00	143

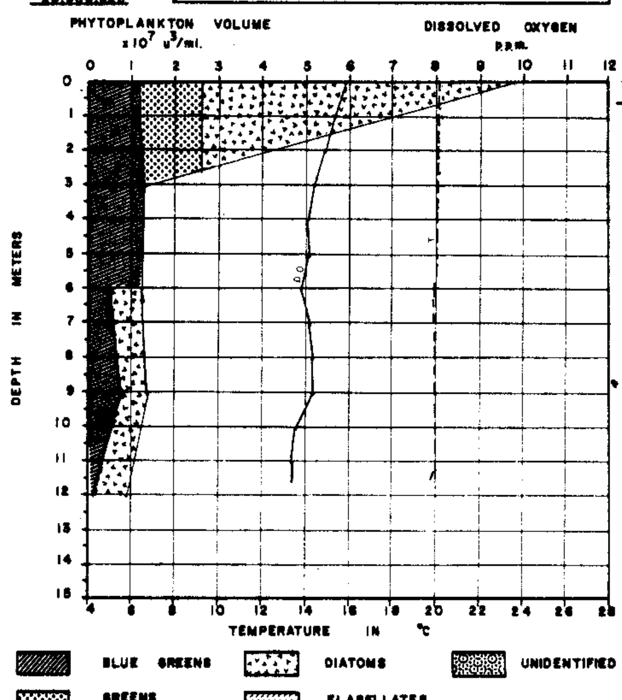


CLEAR LAKE STA. 4

DATE 9-19-72

AVG. u^3/ml. 23,909,820

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.08	0.14	0.7	0.00	0.02	141
BOTT.	0.24	0.39	0.6	0.23	0.06	142

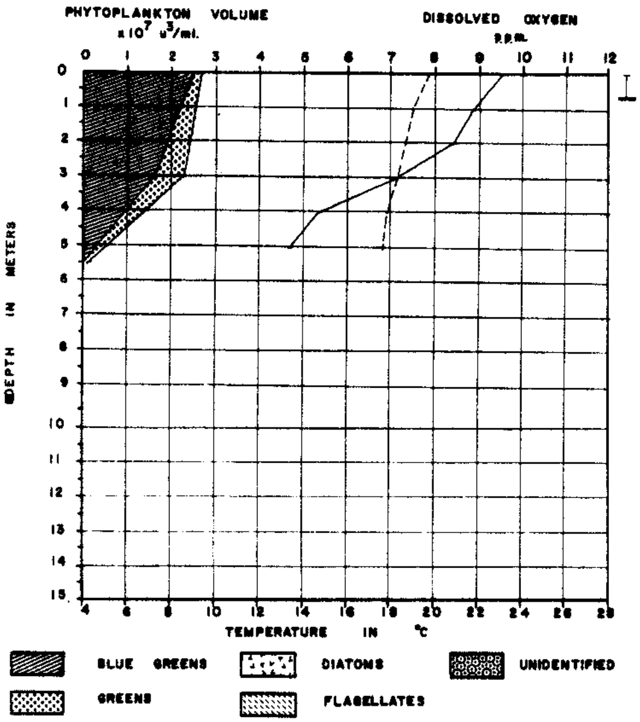


CLEAR LAKE STA.1

DATE 10-3-72

AVG. u^3/ml.
19,436,304

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.12	0.19	0.8	0.00	0.01	137
BOTT.	0.14	0.19	0.8	0.08	0.14	141

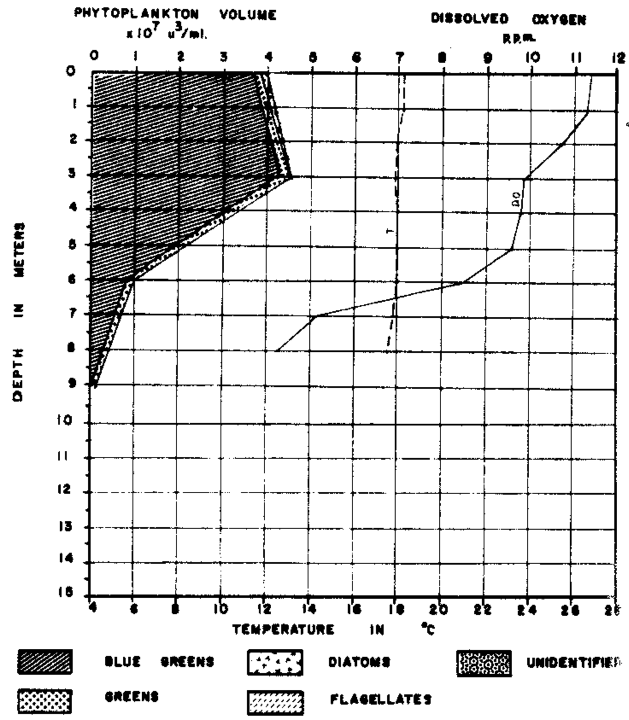


CLEAR LAKE STA.3

DATE 10-3-72

AVG. u^3/ml.
26,017,346

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.06	1.0	0.00	0.00	146
BOTT.	0.03	0.09	0.7	0.18	0.00	147

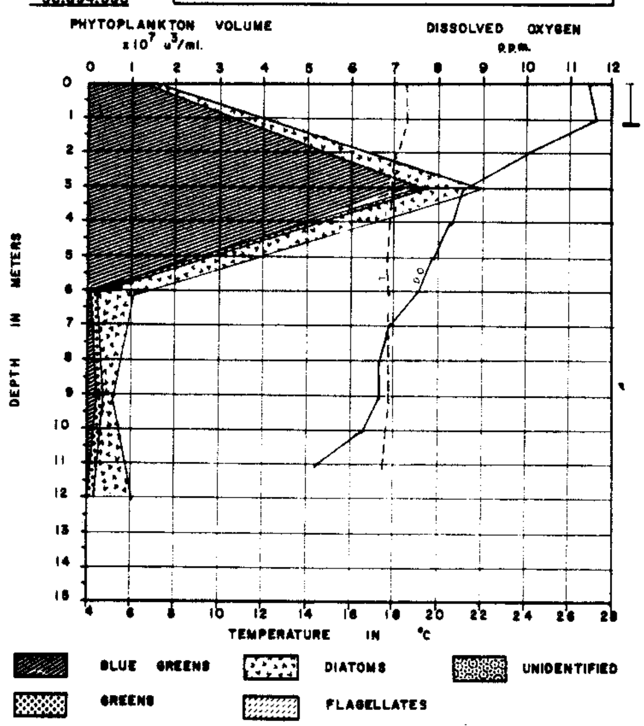


CLEAR LAKE STA.4

DATE 10-3-72

AVG. u^3/ml.
30,894,835

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.07	0.12	1.0	0.02	0.01	141
BOTT.	0.05	0.15	0.9	0.12	0.00	143

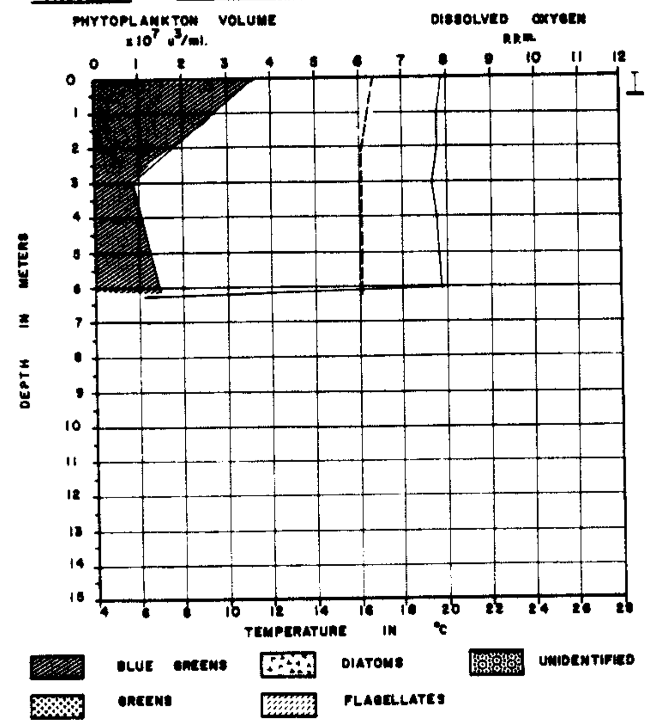


CLEAR LAKE STA.1

DATE 10-20-72

AVG. u^3/ml. 17,891,073

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.13	0.16	0.7	0.00	0.07	133
BOTT.	0.13	0.16	0.6	0.00	0.08	133

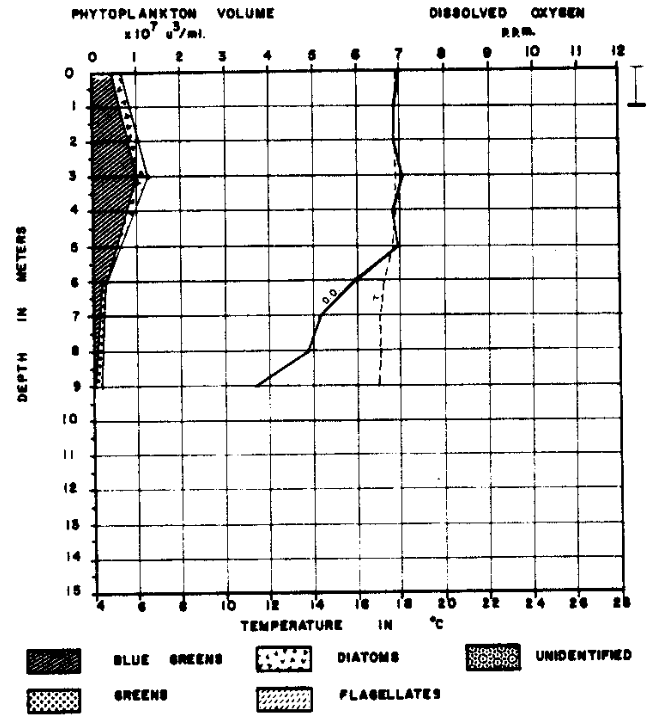


CLEAR LAKE STA.3

DATE 10-20-72

AVG. u^3/ml. 7,534,511

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.06	0.7	0.34	0.00	148
BOTT.	0.20	0.22	0.7	0.42	0.12	148

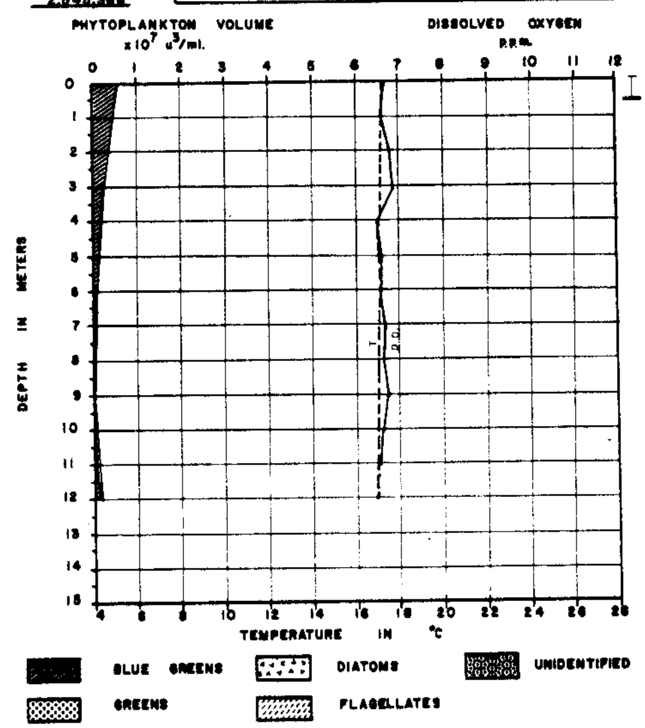


CLEAR LAKE STA.4

DATE 10-20-72

AVG. u^3/ml. 2,645,388

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.09	0.10	0.8	0.30	0.03	143
BOTT.	0.22	0.22	0.8	0.31	0.14	141

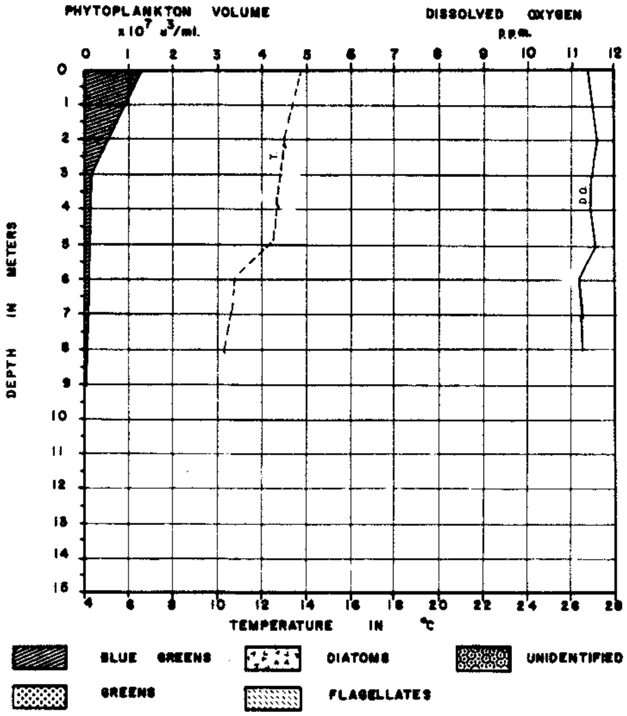


CLEAR LAKE STA. 1

DATE 4-9-73

AVG. u^3/ml. 406,336

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.04	0.6	0.00	0.24	104
BOTT.	0.03	0.05	0.3	0.01	0.39	101

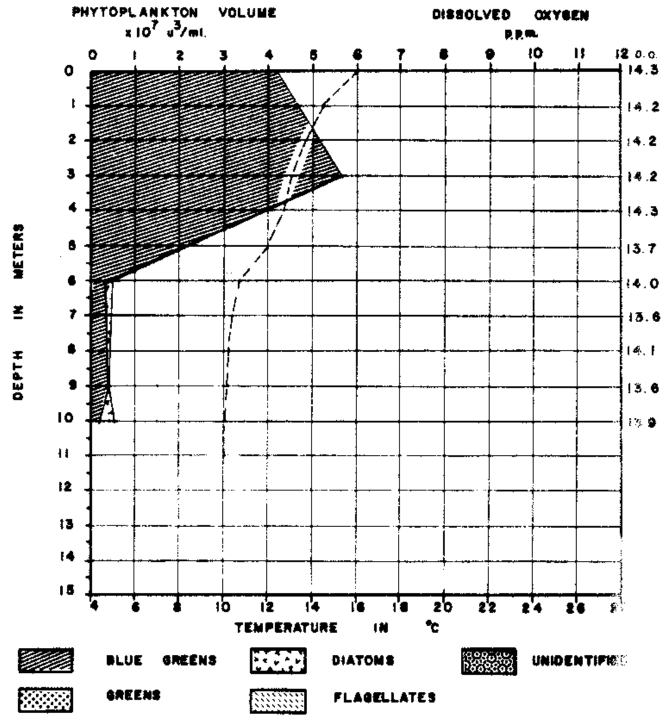


CLEAR LAKE STA. 3

DATE 4-9-73

AVG. u^3/ml. 23,644,779

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.06	1.0	0.00	0.03	124
BOTT.	0.00	0.03	0.5	0.06	0.13	123

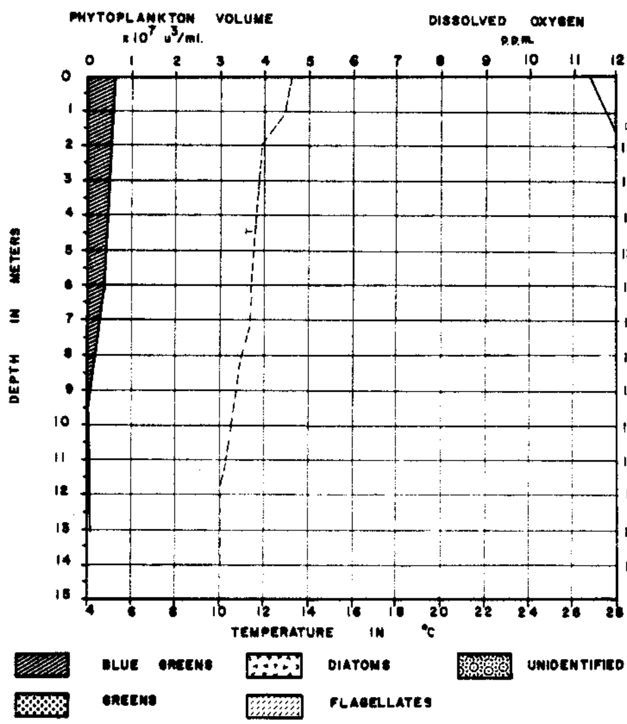


CLEAR LAKE STA. 4

DATE 4-9-73

AVG. u^3/ml. 3,126,592

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.03	0.5	0.01	0.21	111
BOTT.	0.01	0.03	0.4	0.06	0.29	115

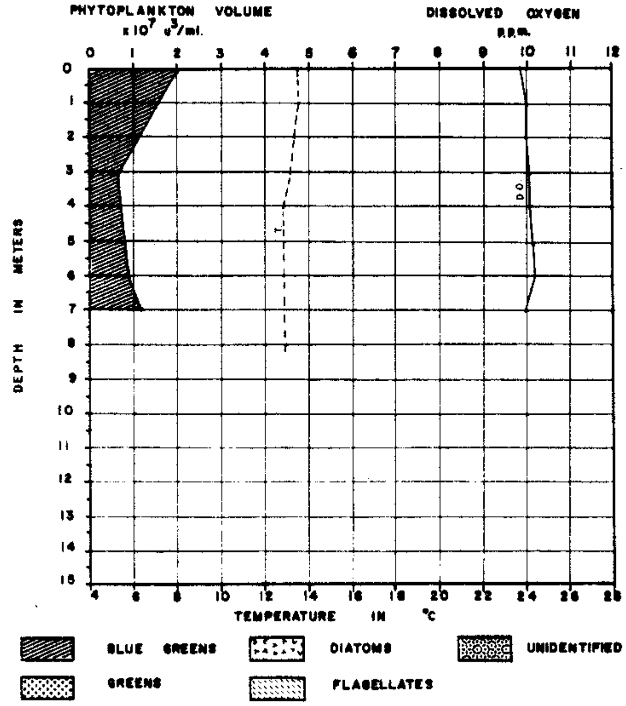


CLEAR LAKE STA. 1

DATE 4-19-73

AVG. u^3/ml. 11,261,438

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.05	0.0	0.00	0.04	111
BOTT.	0.00	0.04	0.4	0.01	0.04	110

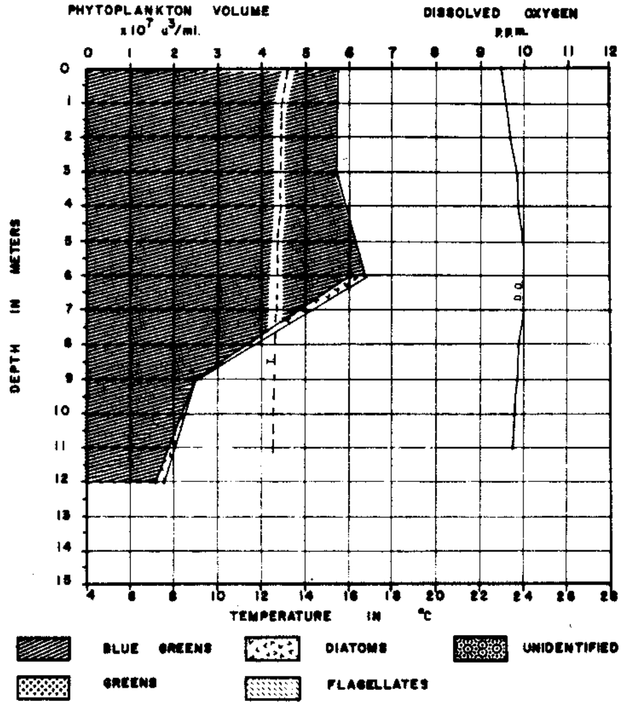


CLEAR LAKE STA. 3

DATE 4-19-73

AVG. u^3/ml. 46,316,977

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.06	1.3	0.00	0.01	124
BOTT.	0.00	0.05	0.9	0.02	0.01	123

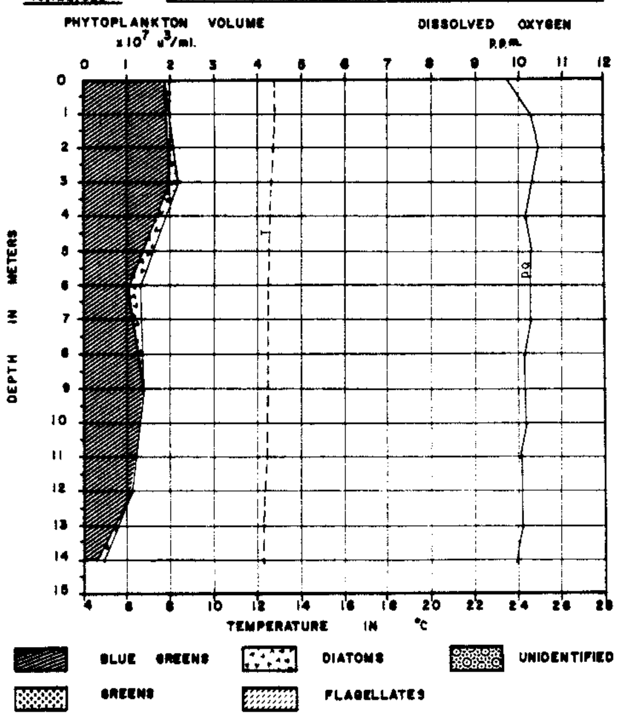


CLEAR LAKE STA. 4

DATE 4-19-73

AVG. u^3/ml. 15,122,025

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.03	0.6	0.00	0.08	114
BOTT.	0.00	0.02	0.4	0.00	0.10	114

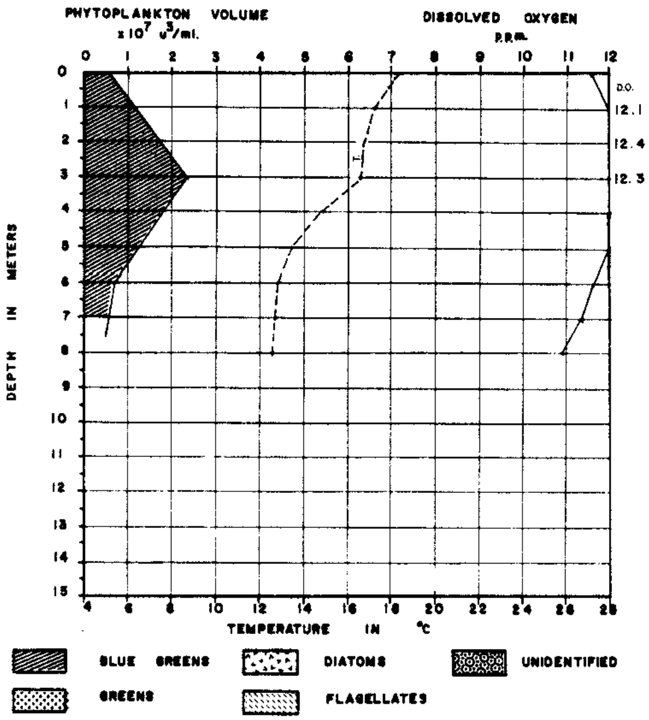


CLEAR LAKE STA. 1

DATE 4-27-73

AVG. u^3/ml.
14,108,173

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.01	0.3	0.00	0.06	98
BOTT.	0.01	0.03	0.3	0.01	0.15	106

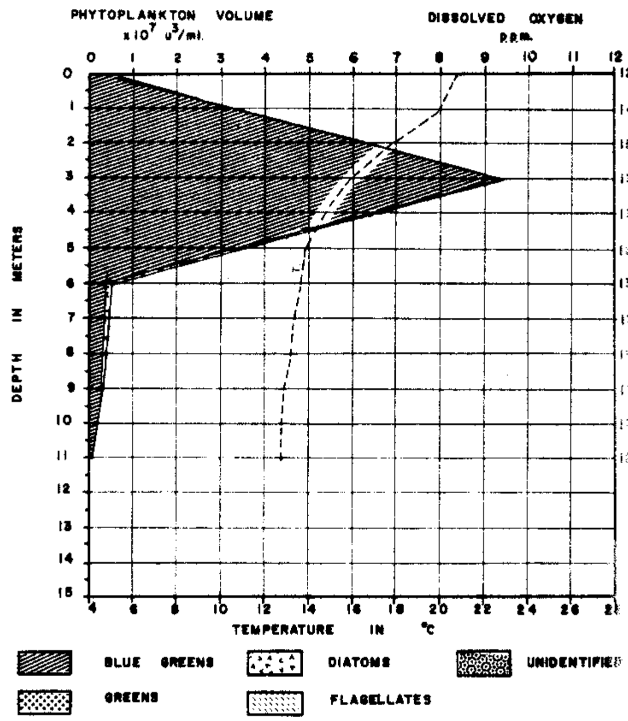


CLEAR LAKE STA. 3

DATE 4-27-73

AVG. u^3/ml.
28,900,445

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.07	2.0	0.00	0.02	116
BOTT.	0.03	0.04	0.6	0.06	0.02	120

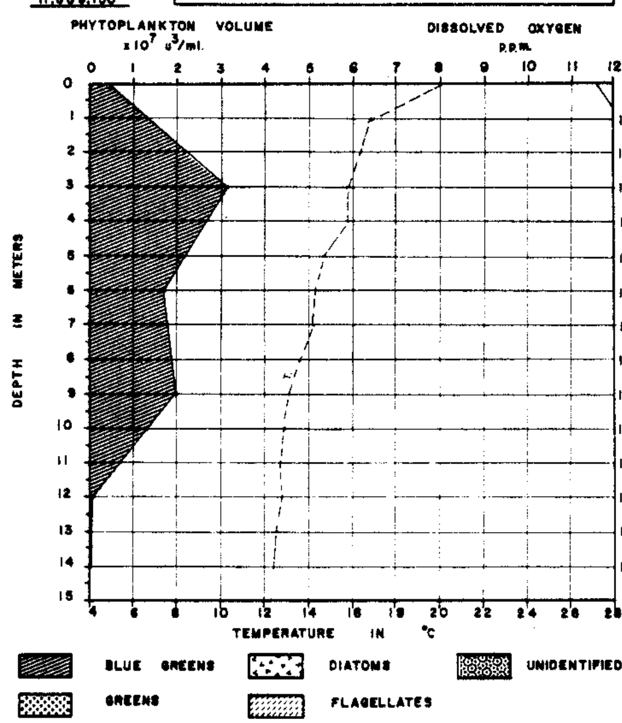


CLEAR LAKE STA. 4

DATE 4-27-73

AVG. u^3/ml.
11,689,150

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.02	0.5	0.00	0.01	109
BOTT.	0.02	0.03	0.0	0.05	0.03	112

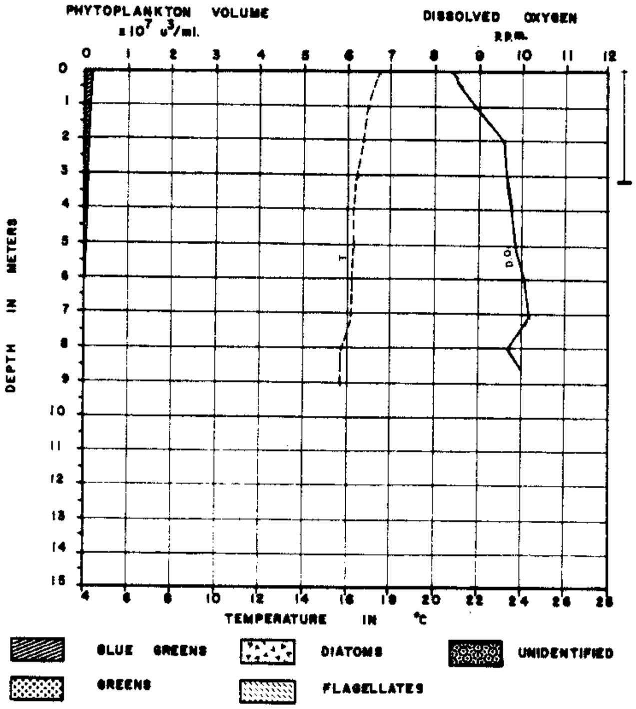


CLEAR LAKE STA. I

DATE 5-8-73

AVG. u^3/ml. 1,407,394

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.04	0.4	0.14	0.00	107
BOTT.	0.00	0.06	0.4	0.10	0.01	107

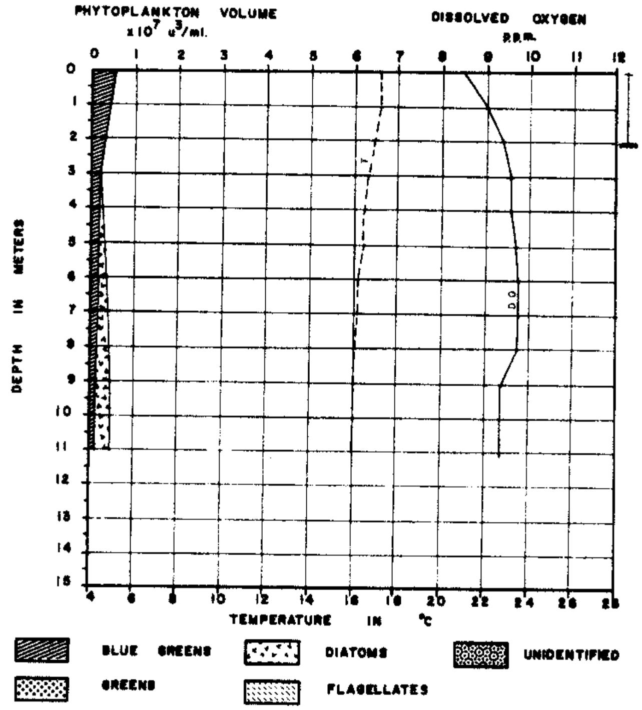


CLEAR LAKE STA. 3

DATE 5-8-73

AVG. u^3/ml. 4,394,514

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.06	0.7	0.41	0.00	117
BOTT.	0.00	0.07	0.6	0.41	0.00	118

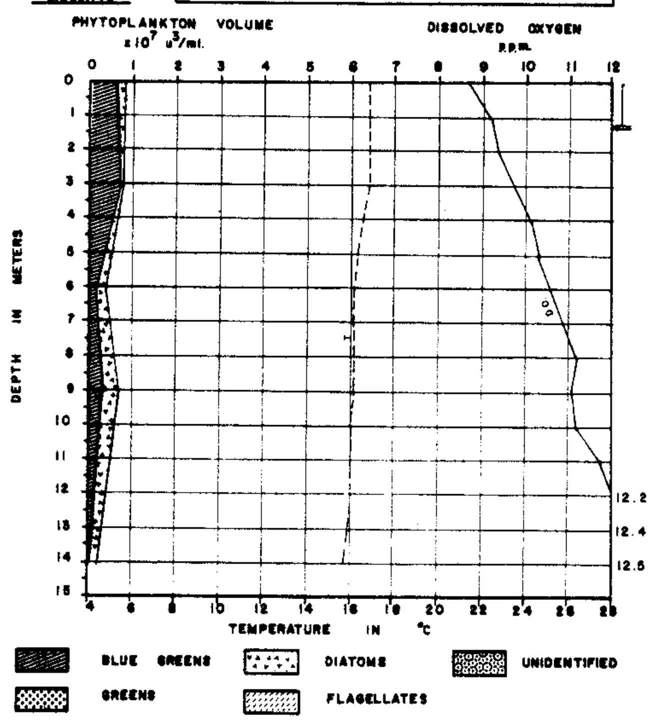


CLEAR LAKE STA. 4

DATE 5-8-73

AVG. u^3/ml. 5,285,146

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.10	0.6	0.19	0.00	110
BOTT.	0.01	0.08	0.5	0.24	0.00	109

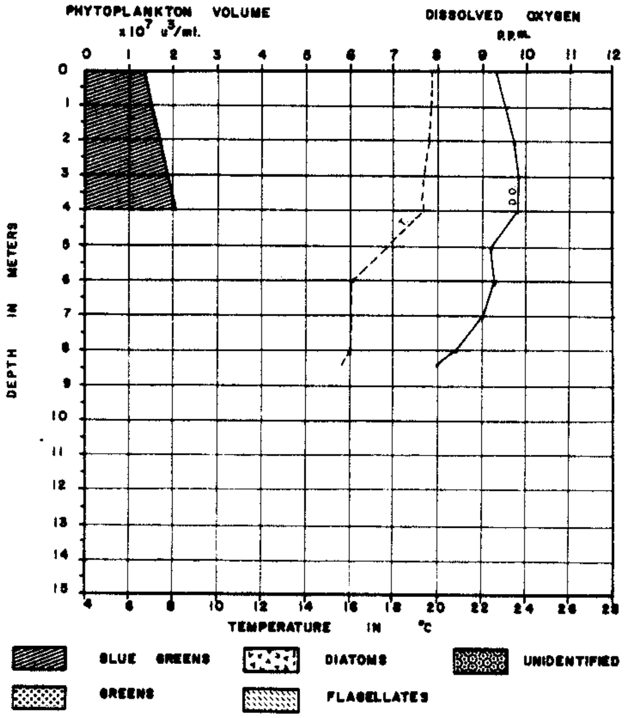


CLEAR LAKE STA. 1

DATE 5-15-73

AVG. u^3/ml. 10,079,013

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.03	0.5	0.00	0.00	110
BOTT.	0.05	0.10	0.4	0.31	0.00	110

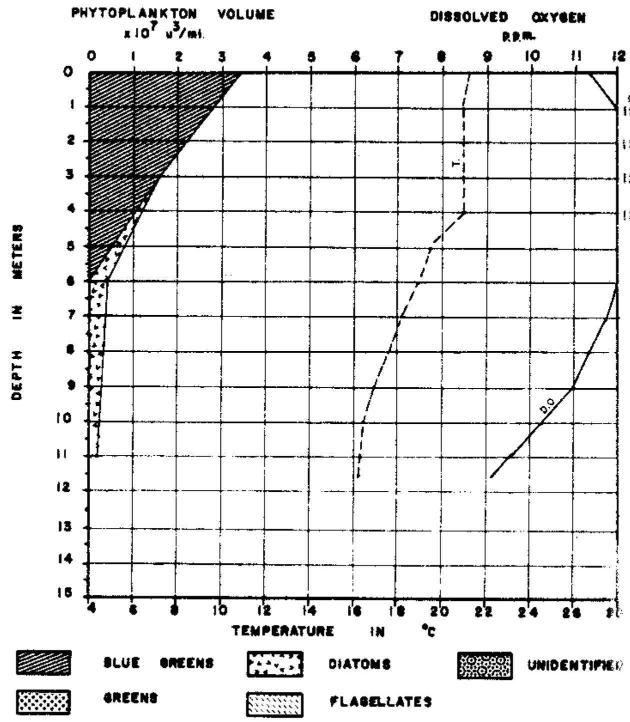


CLEAR LAKE STA. 3

DATE 5-15-73

AVG. u^3/ml. 6,280,840

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.10	1.2	0.22	0.00	116
BOTT.	0.05	0.17	0.7	0.96	0.00	123

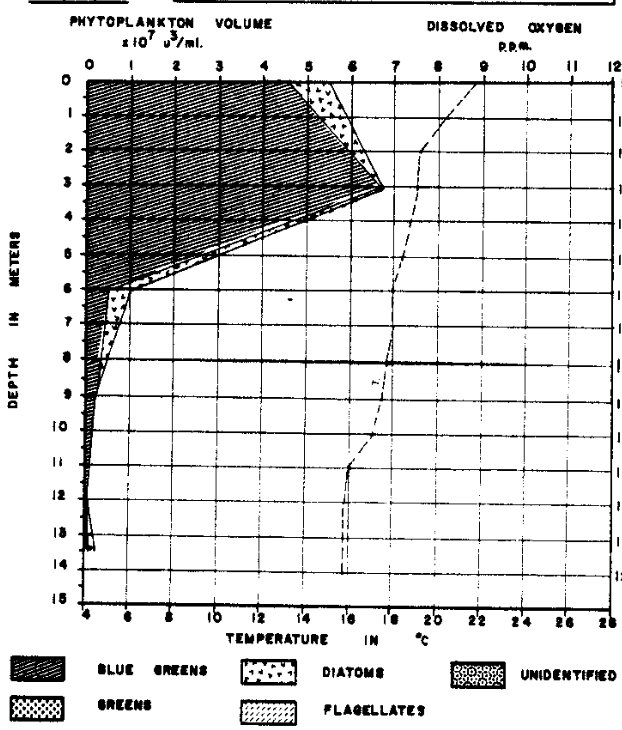


CLEAR LAKE STA. 4

DATE 5-15-73

AVG. u^3/ml. 24,129,435

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.12	1.4	0.00	0.00	115
BOTT.	0.04	0.11	0.5	0.40	0.00	115

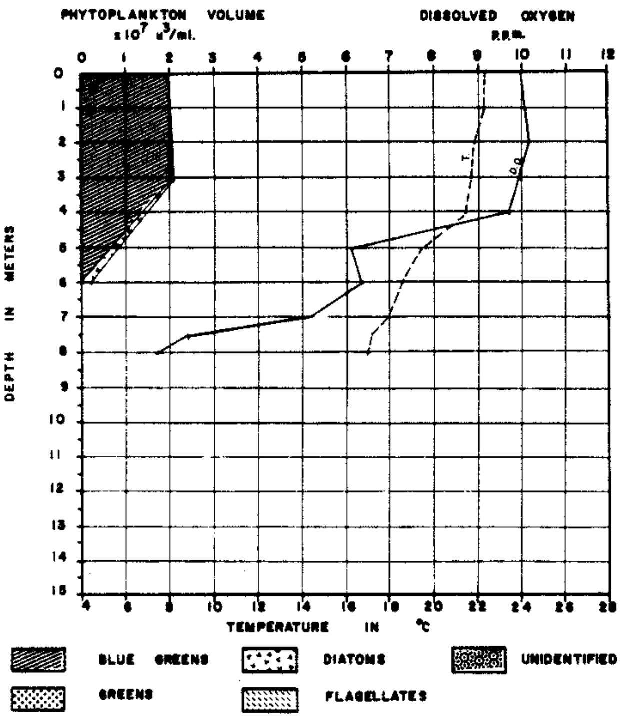


CLEAR LAKE STA. 1

DATE 5-31-73

AVG. u^3/ml. 5,728,276

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.05	0.6	0.00	0.01	113
BOTT.	0.05	0.09	0.4	0.19	0.7	114

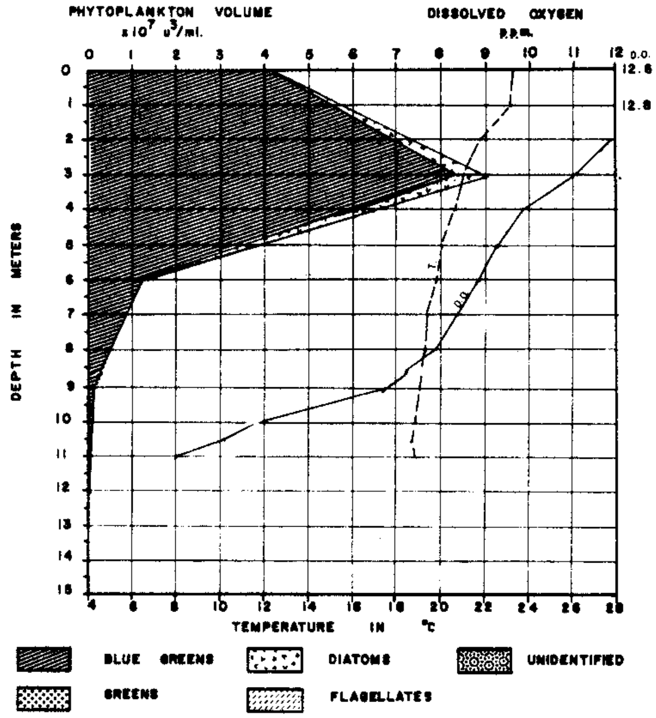


CLEAR LAKE STA. 3

DATE 5-31-73

AVG. u^3/ml. 34,272,660

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.05	1.0	0.00	0.01	116
BOTT.	0.06	0.22	0.7	0.58	0.01	124

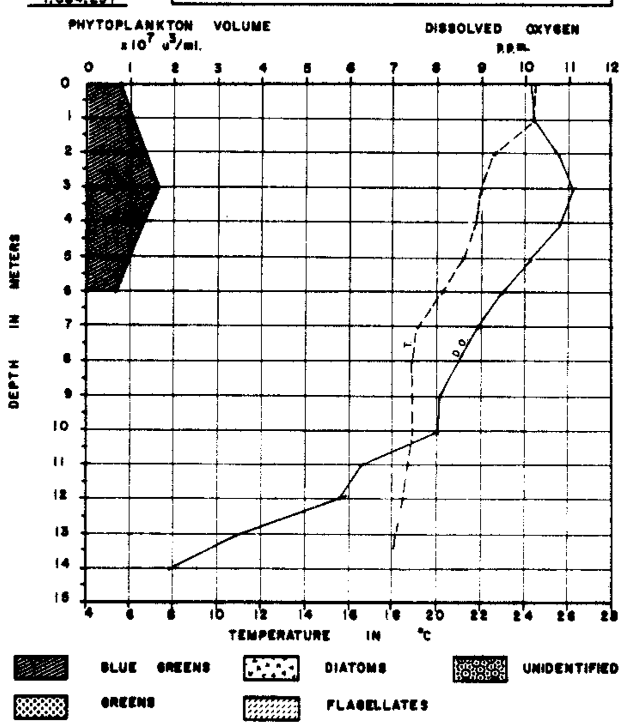


CLEAR LAKE STA. 4

DATE 5-31-73

AVG. u^3/ml. 7,384,257

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.04	0.6	0.00	0.00	117
BOTT.	0.10	0.26	0.7	0.46	0.02	118

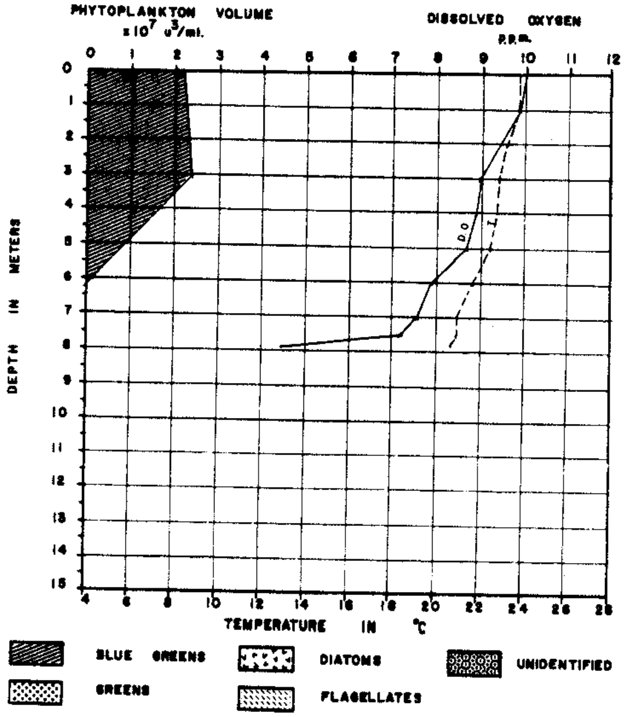


CLEAR LAKE STA. 1

DATE 6-27-73

AVG. u^3/ml.
18,042,880

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.08	1.2	0.01	0.00	119
BOTT.	0.05	0.08	0.5	0.04	0.03	114

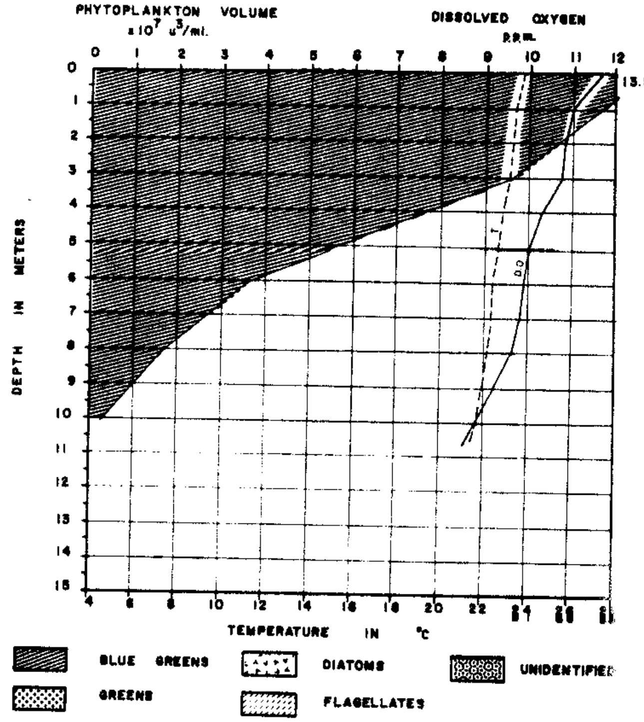


CLEAR LAKE STA. 3

DATE 6-27-73

AVG. u^3/ml.
62,646,199

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.12	2.5	0.02	0.00	119
BOTT.	0.02	0.07	0.9	0.20	0.00	118

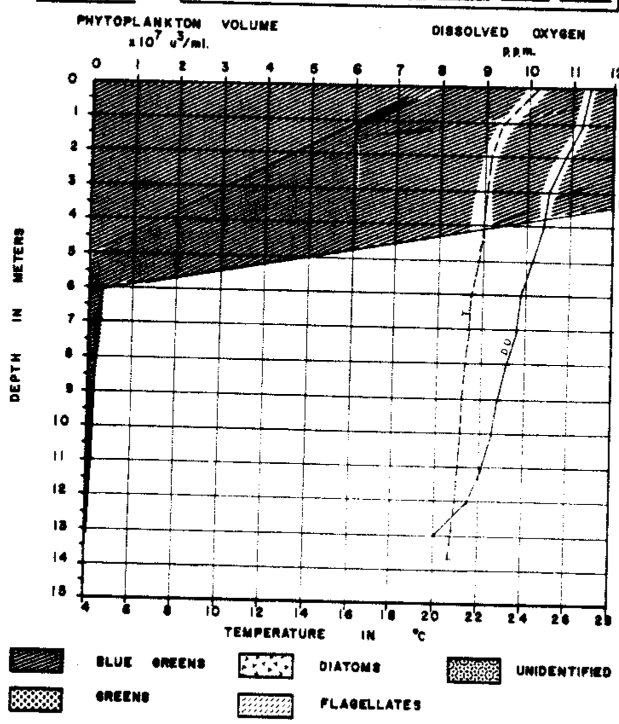


CLEAR LAKE STA. 4

DATE 6-27-73

AVG. u^3/ml.
20,086,054

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.18	2.1	0.02	0.00	116
BOTT.	0.06	0.08	0.4	0.13	0.00	115

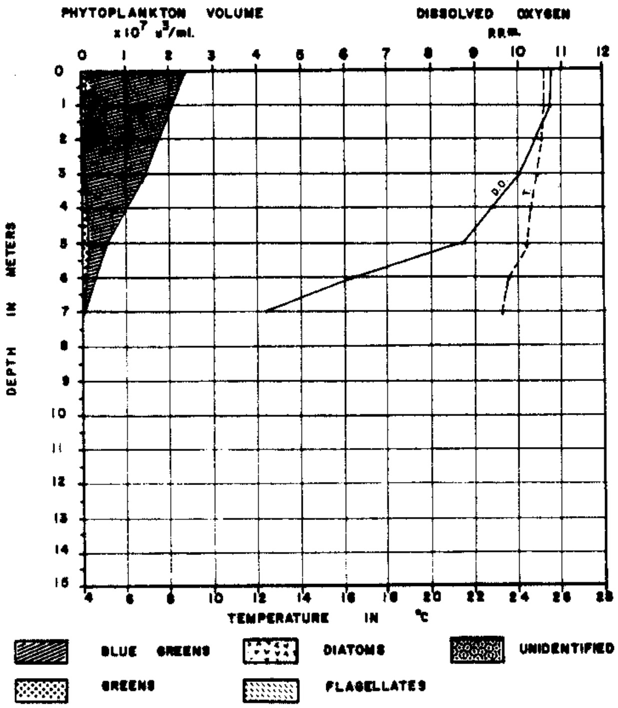


CLEAR LAKE STA. 1

DATE 7-11-73

AVG. u^3/ml. 12,753,447

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.01	0.06	0.9	0.00	0.01	118
BOTT.	0.09	0.14	0.8	0.10	0.06	118

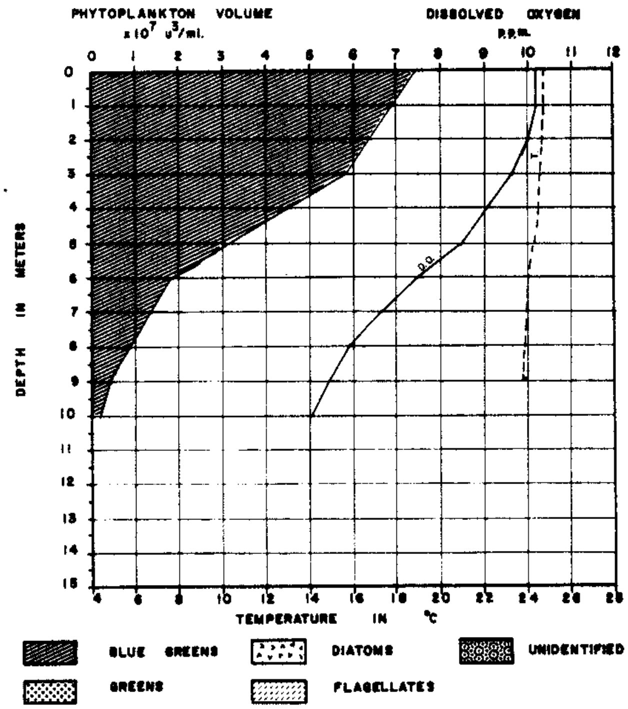


CLEAR LAKE STA. 3

DATE 7-11-73

AVG. u^3/ml. 35,138,262

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.10	1.7	0.00	0.02	121
BOTT.	0.02	0.07	0.8	0.25	0.02	121

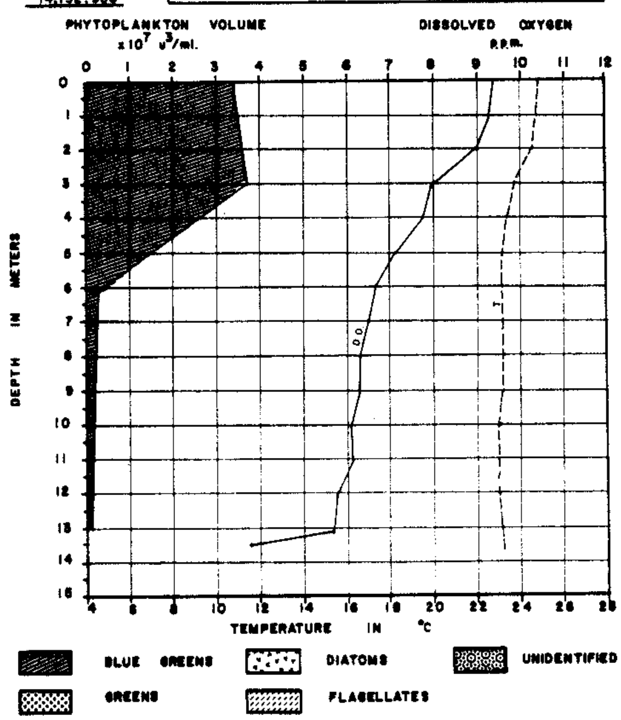


CLEAR LAKE STA. 4

DATE 7-11-73

AVG. u^3/ml. 14,132,906

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.07	1.4	0.03	0.01	118
BOTT.	0.07	0.13	0.7	0.22	0.02	118

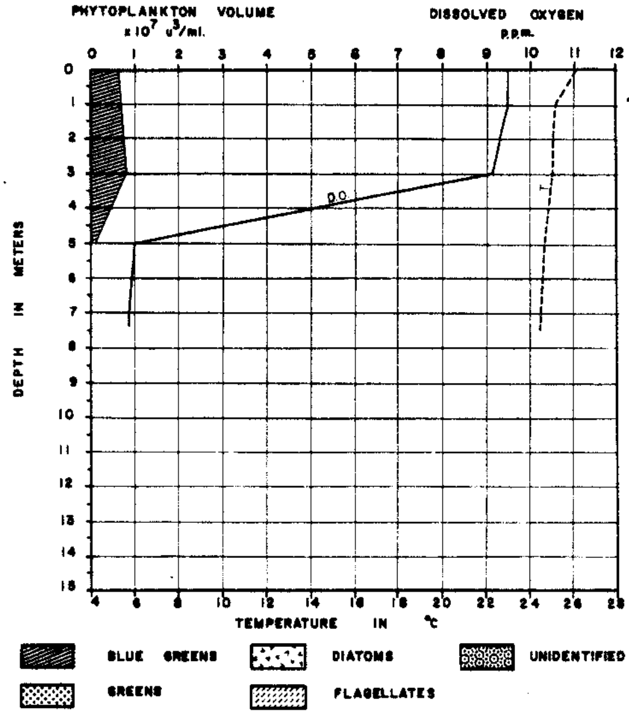


CLEAR LAKE STA. 1

DATE 7-31-73

AVG. u^3/ml. 4,637,522

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.06	0.18	0.6	0.00	0.02	114
BOTT.	0.18	0.23	0.5	0.20	0.03	123

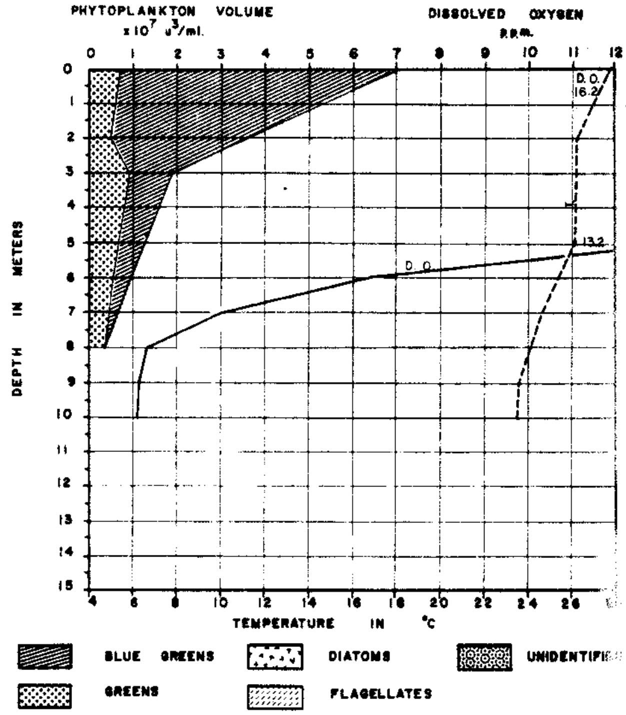


CLEAR LAKE STA. 3

DATE 7-31-73

AVG. u^3/ml. 29,518,665

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.08	1.0	0.01	0.04	120
BOTT.	0.08	0.38	0.8	0.72	0.04	127

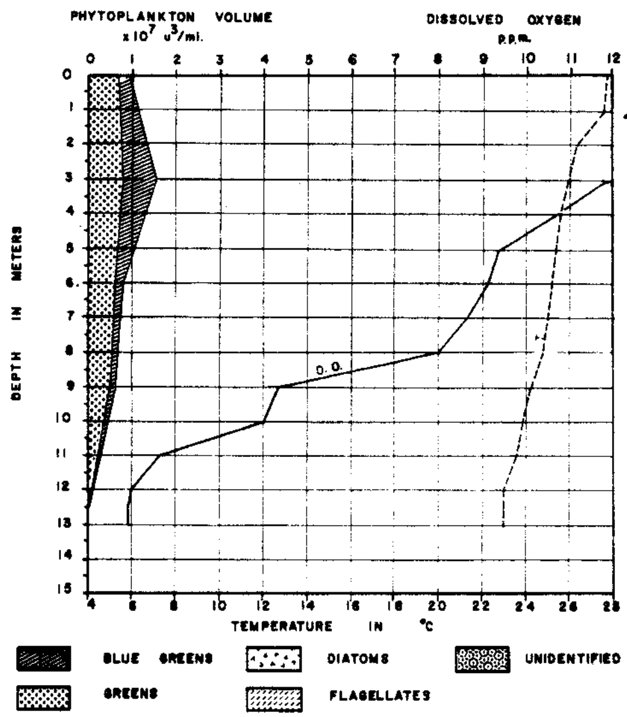


CLEAR LAKE STA. 4

DATE 7-31-73

AVG. u^3/ml. 9,887,718

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.14	0.7	0.00	0.01	120
BOTT.	0.17	0.25	0.6	0.48	0.03	122

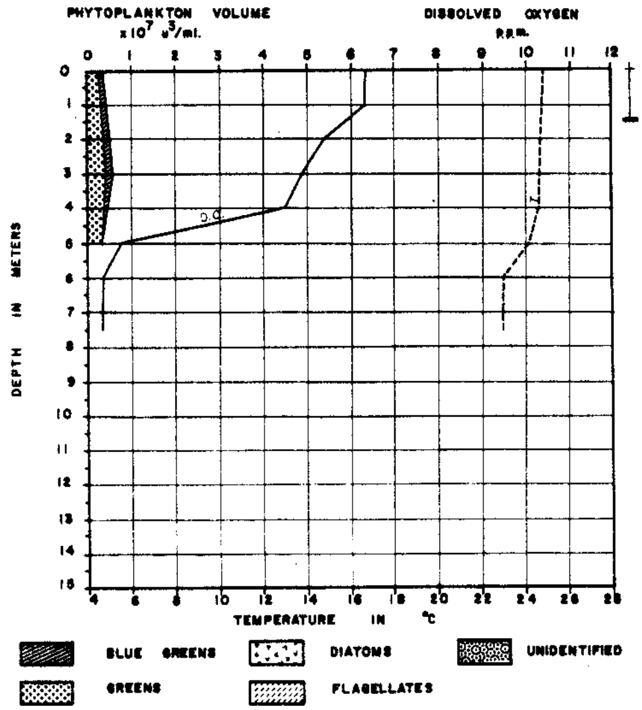


CLEAR LAKE STA. 1

DATE 8-16-73

AVG. u^3/ml. 3,786,360

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.16	0.23	0.6	0.00	0.01	105
BOTT.	0.36	0.70	0.6	0.52	0.01	130

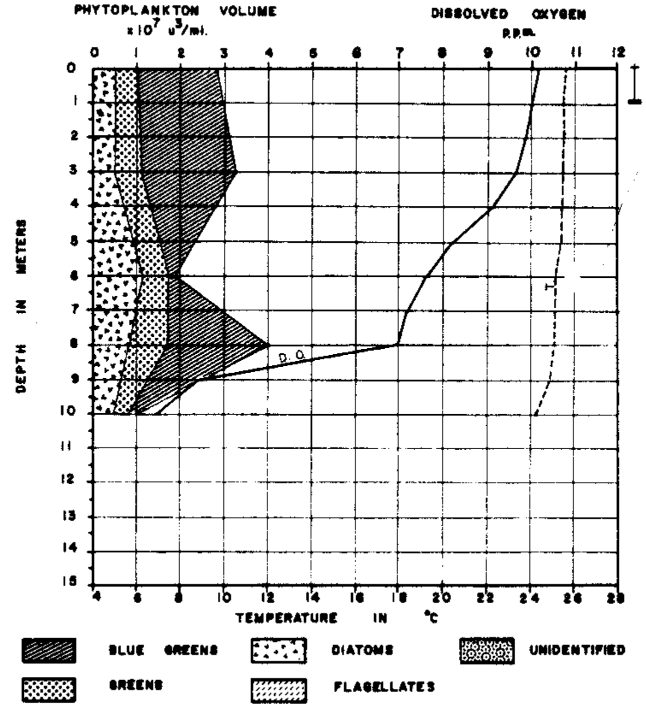


CLEAR LAKE STA. 3

DATE 8-16-73

AVG. u^3/ml. 15,361,731

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.07	0.7	0.01	0.01	124
BOTT.	0.03	0.13	0.8	0.08	0.02	125

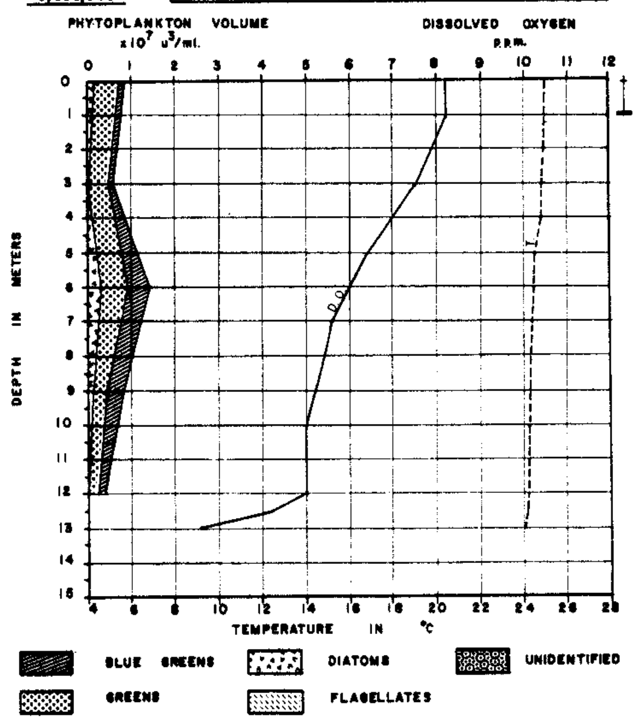


CLEAR LAKE STA. 4

DATE 8-16-73

AVG. u^3/ml. 9,396,886

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.03	0.13	0.7	0.00	0.01	120
BOTT.	0.06	0.13	0.7	0.02	0.01	122

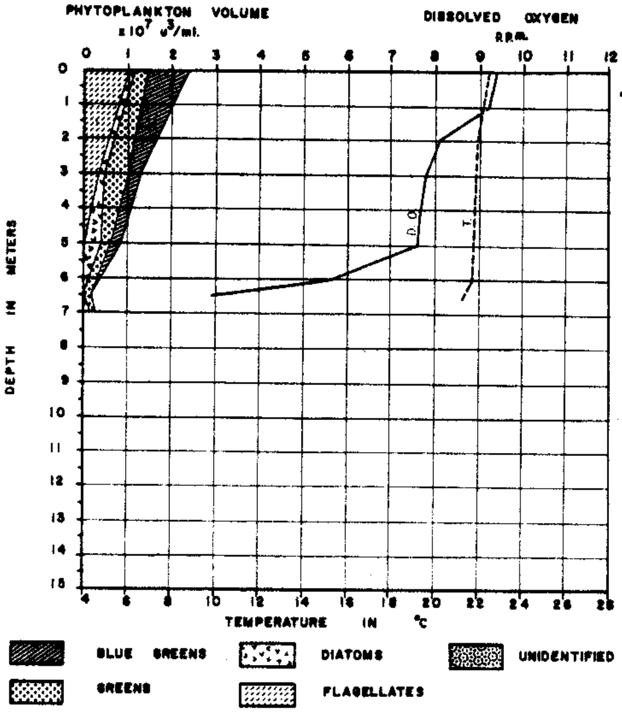


CLEAR LAKE STA. I

DATE 9-6-73

AVG. u^3/ml. 10,732,369

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.14	0.24	1.0	0.02	0.01	
BOTT.	0.16	0.24	0.7	0.18	0.01	

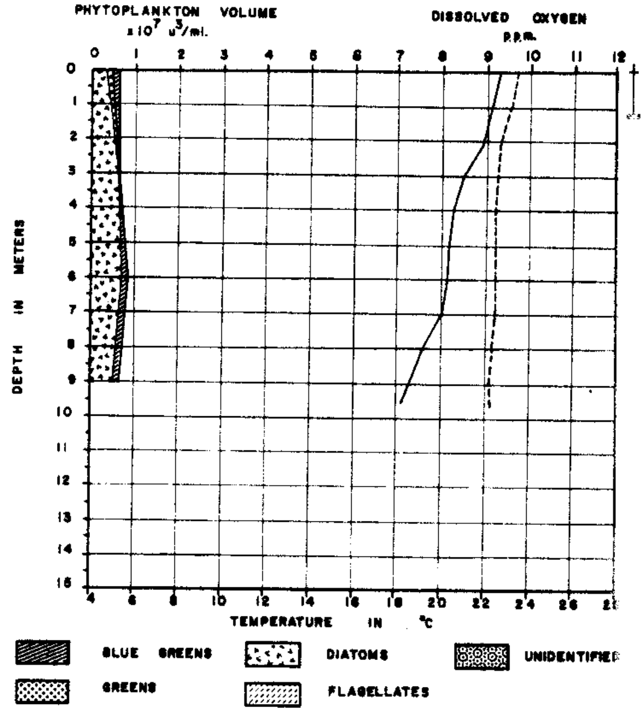


CLEAR LAKE STA. 3

DATE 9-5-73

AVG. u^3/ml. 6,747,858

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.00	0.05	0.6	0.01	0.01	
BOTT.	0.00	0.08	0.9	0.01	0.01	

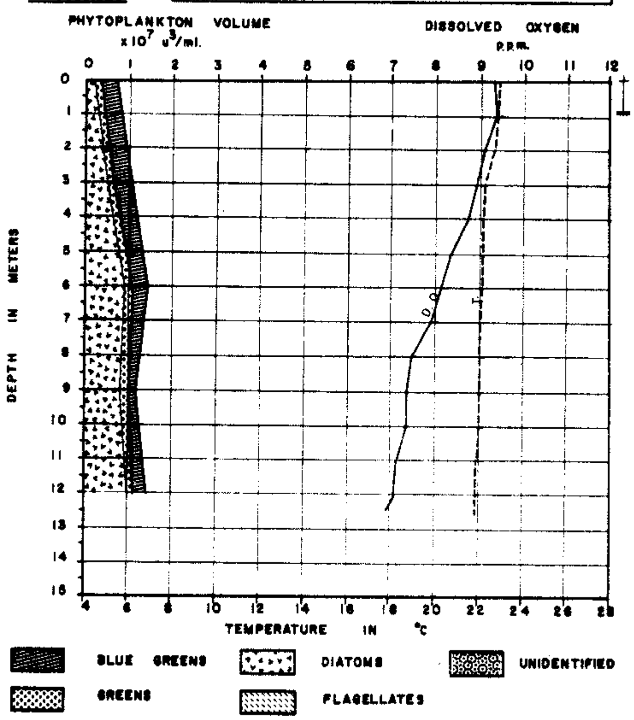


CLEAR LAKE STA. 4

DATE 9-5-73

AVG. u^3/ml. 10,058,523

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.14	1.0	0.00	0.02	
BOTT.	0.05	0.13	0.8	0.06	0.01	

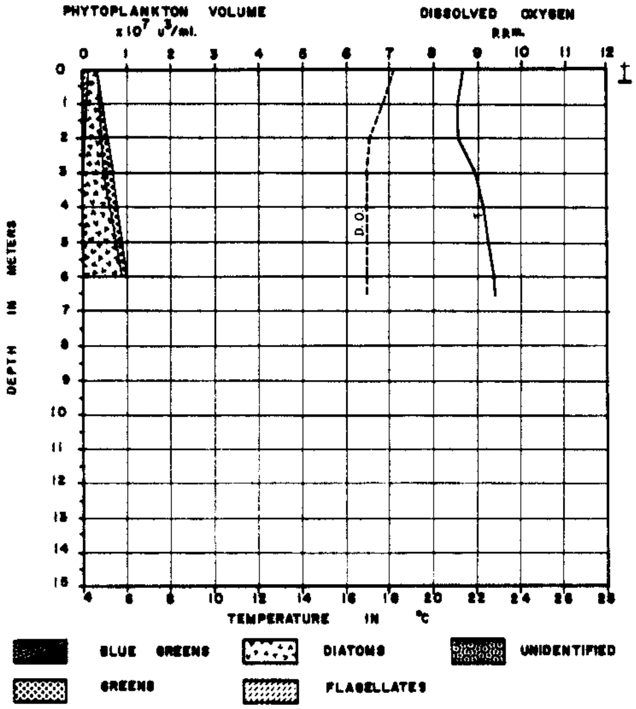


CLEAR LAKE STA. 1

DATE 10-10-73

AVG. u^3/ml.
6,629,197

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.10	0.15	0.6	0.00	0.02	130
BOTT.	0.10	0.16	0.6	0.00	0.02	131

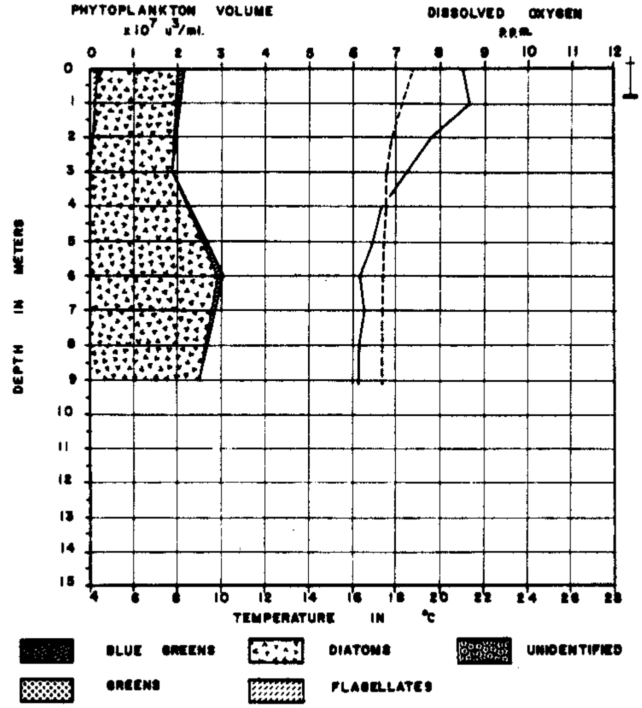


CLEAR LAKE STA. 3

DATE 10-10-73

AVG. u^3/ml.
24,462,365

	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.02	0.04	0.5	0.06	0.01	133
BOTT.	0.02	0.04	0.6	0.08	0.00	132

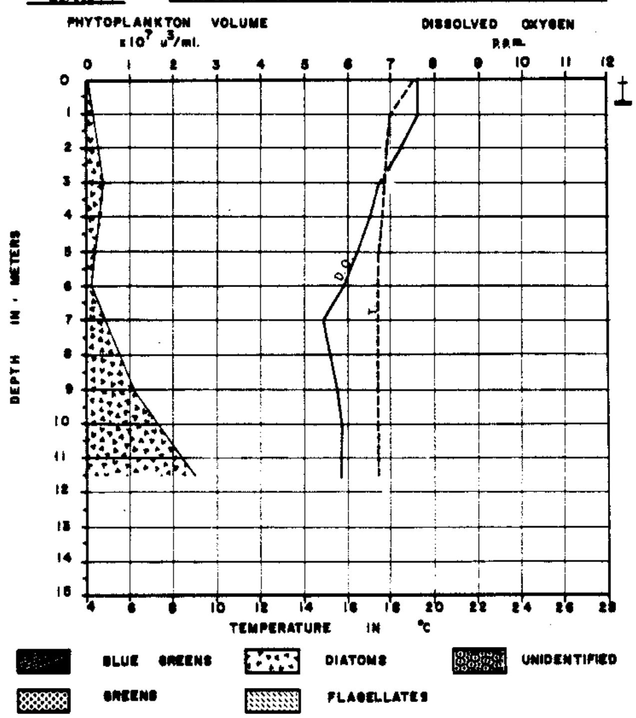


CLEAR LAKE STA. 4

DATE 10-10-73

AVG. u^3/ml.
6,819,244

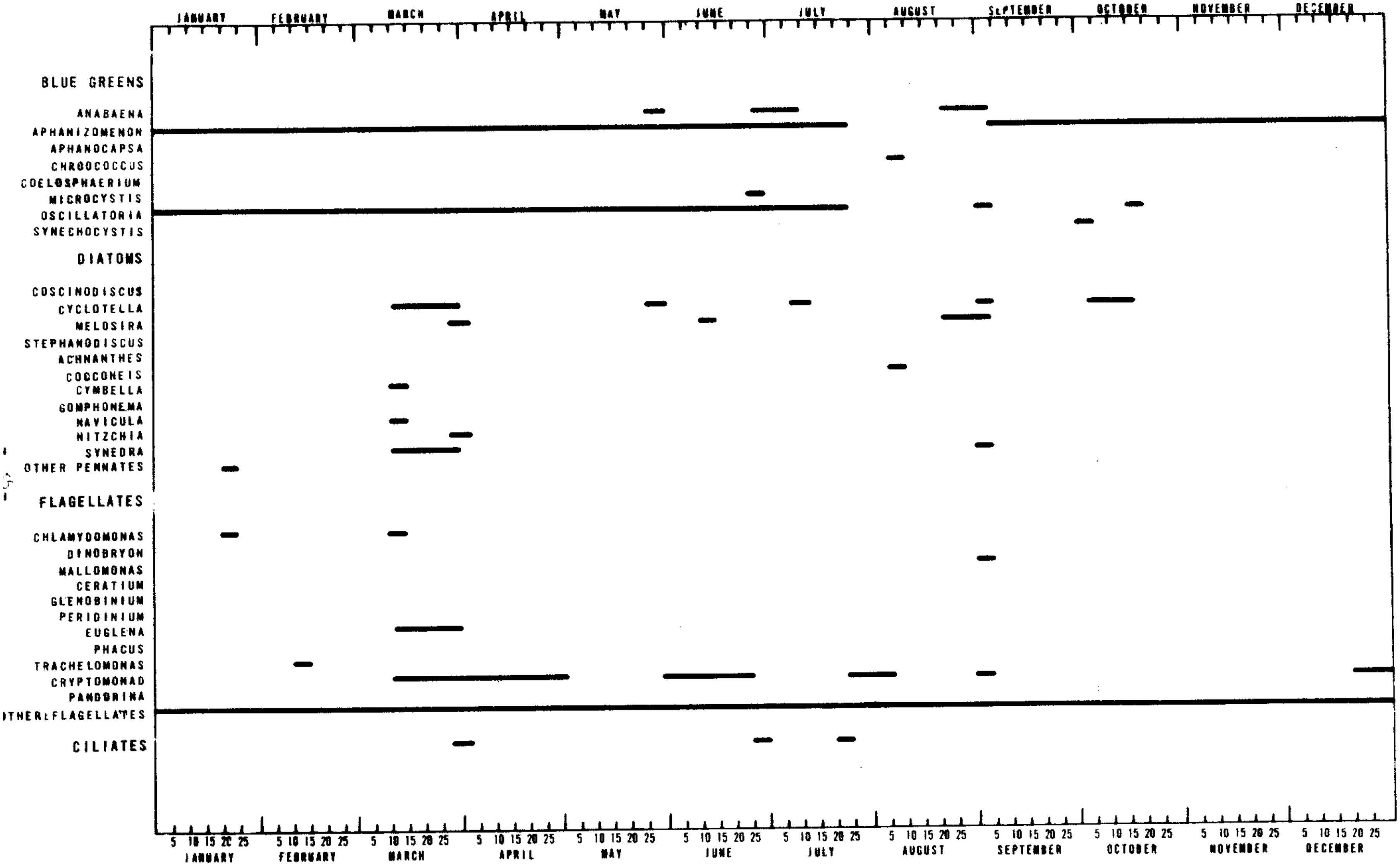
	ORTHO PO_4	TOTAL P-P	ORG N -N	NH_3 -N	NO_3 -N	ALK mg/l.
SURF.	0.04	0.09	0.6	0.08	0.00	130
BOTT.	0.05	0.10	0.7	0.10	0.00	130



APPENDIX C

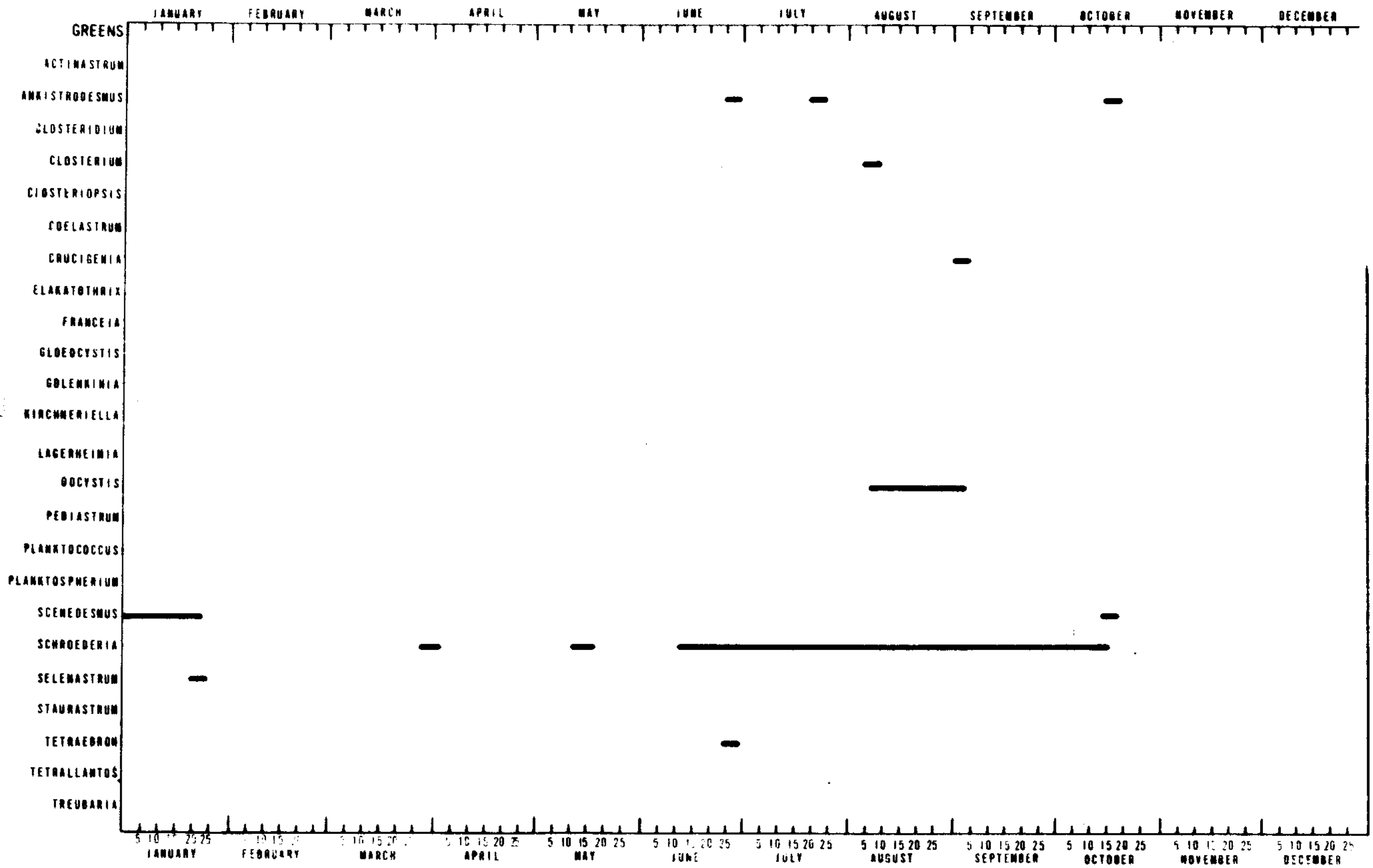
CHRONOLOGICAL APPEARANCE OF ALGAE
1968-1973

CLEAR LAKE UPPER ARM STATION 1
1968



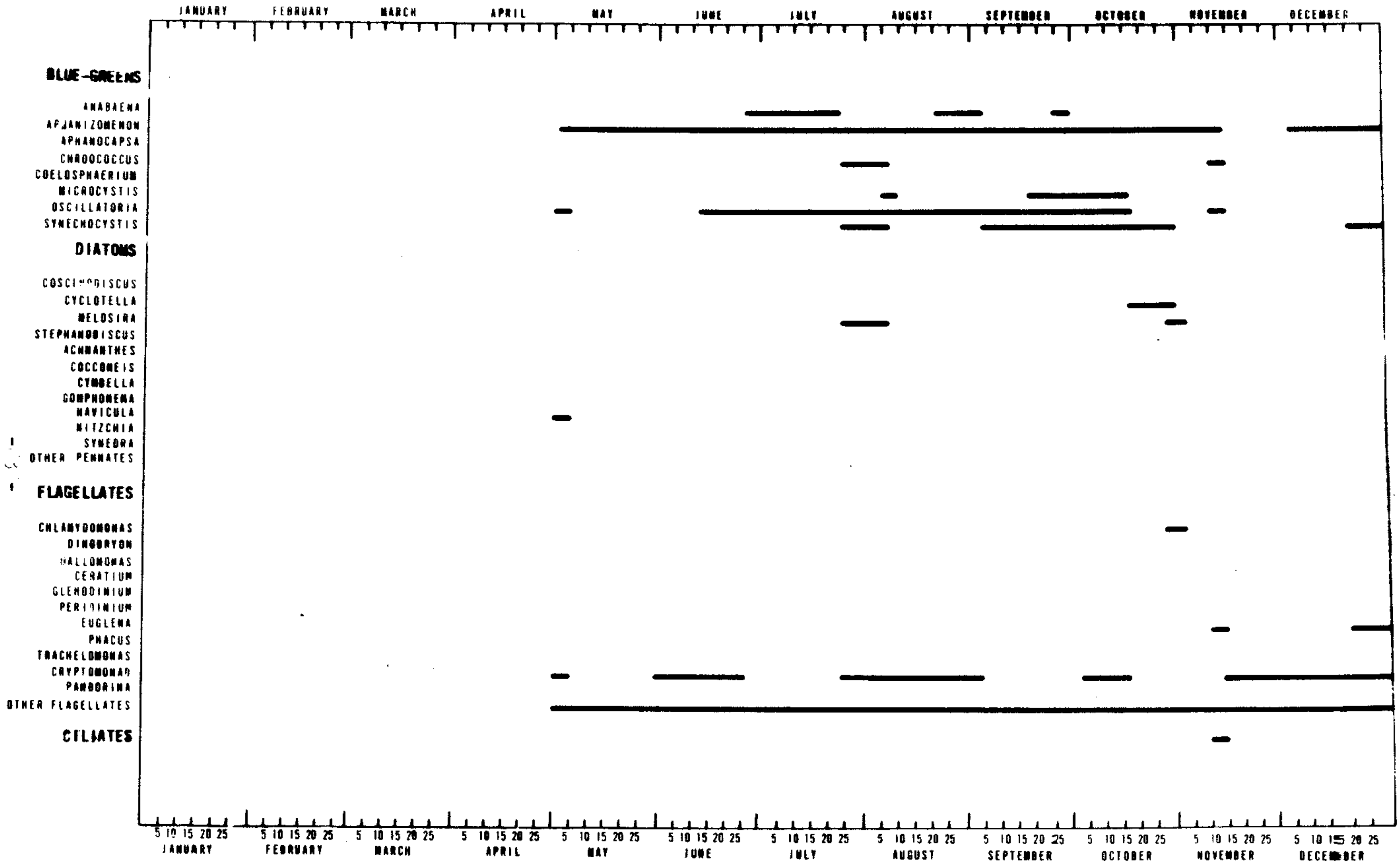
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE UPPER ARM STATION 1
1968



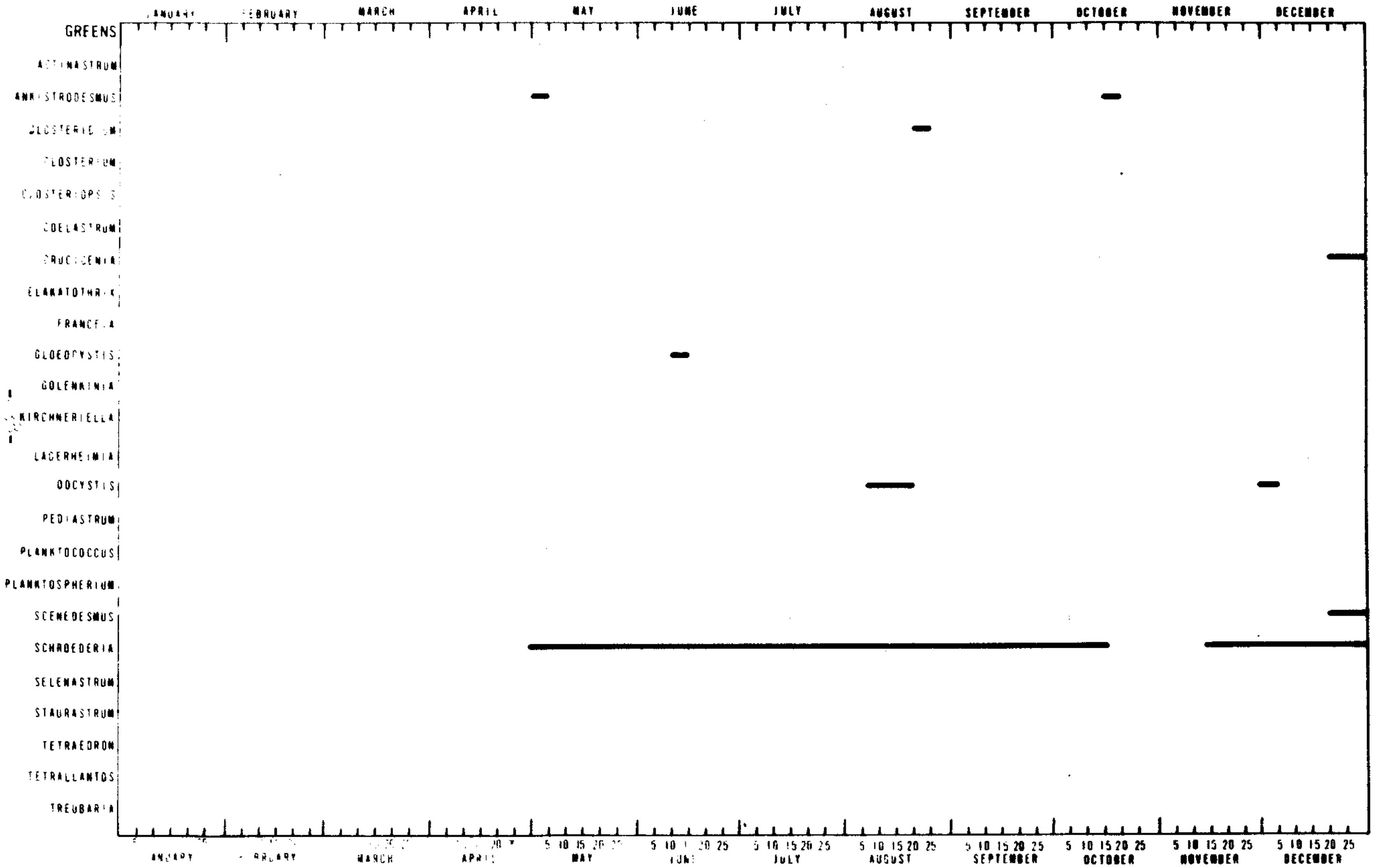
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE LOWER ARM STATION 3
1960



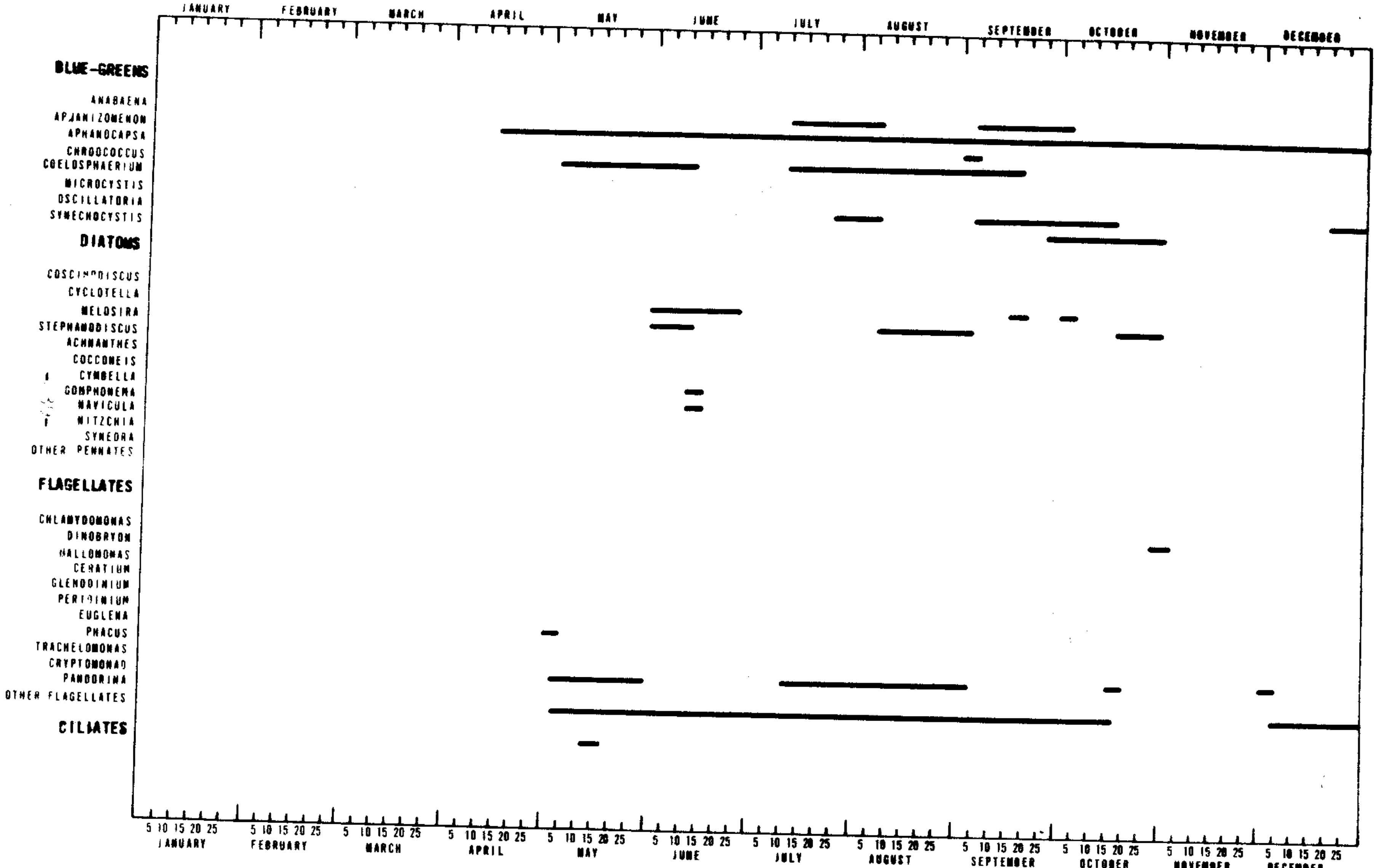
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE LOWER ARM STATION 3
1968

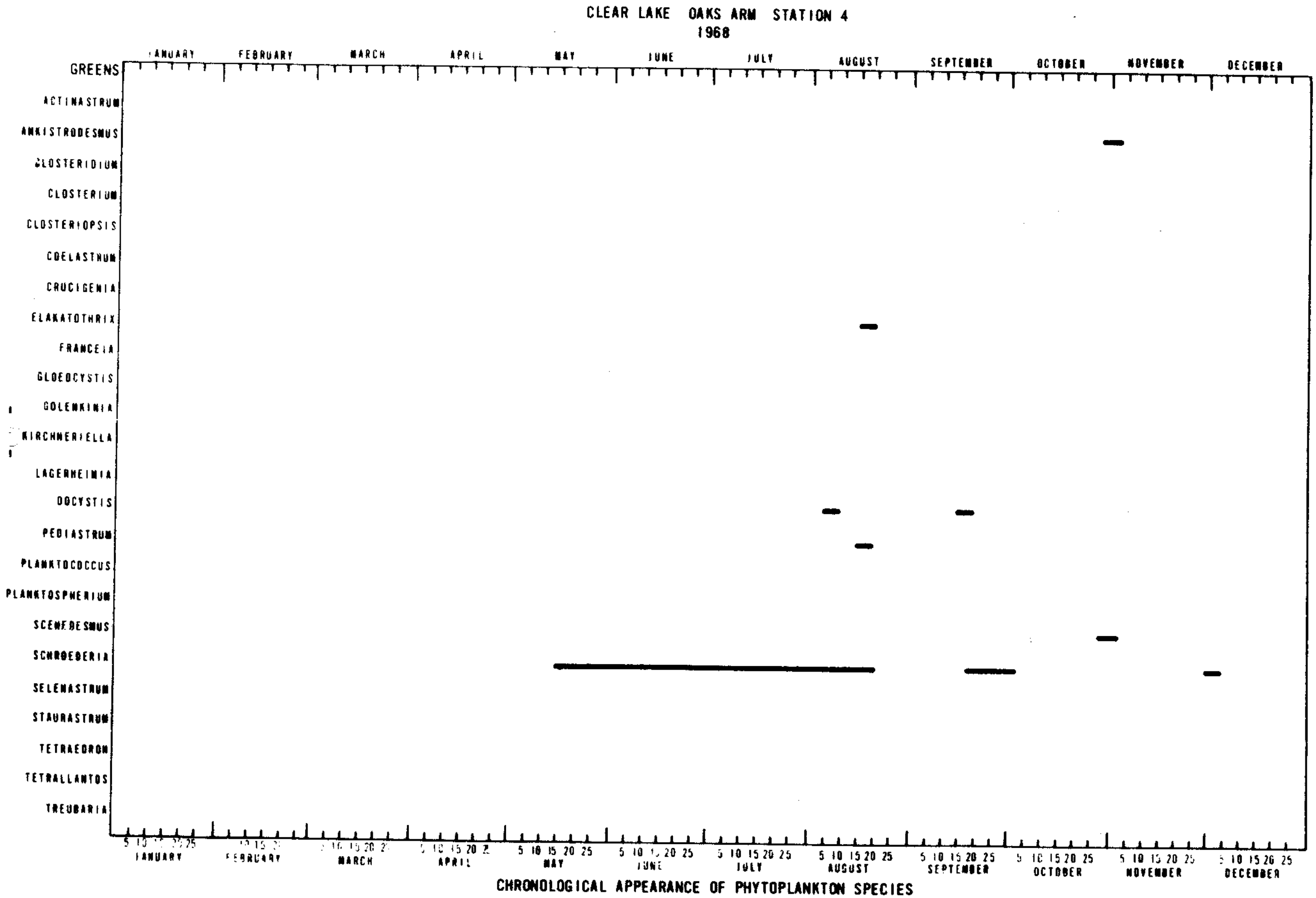


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

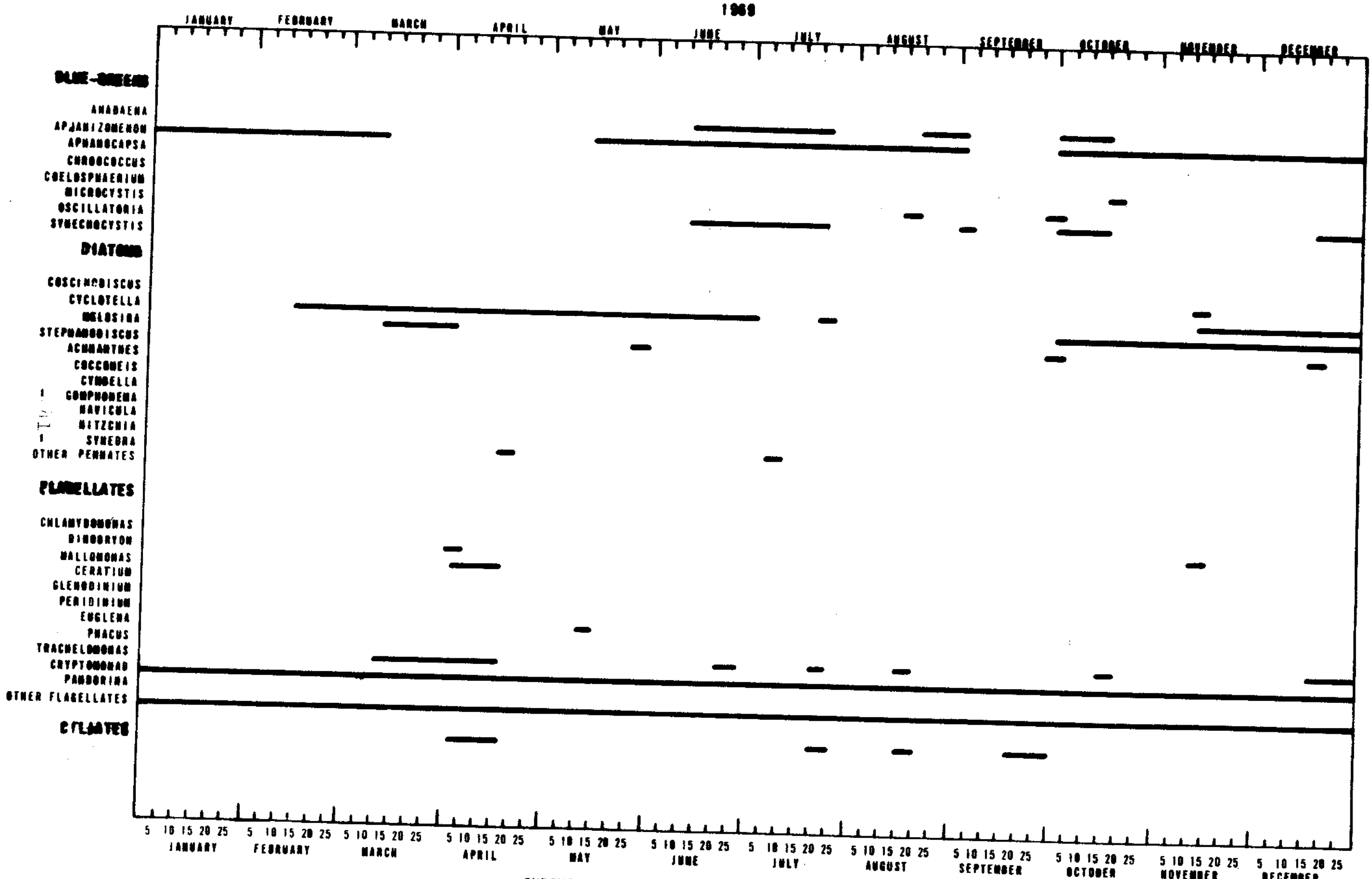
CLEAR LAKE OAKS ARM STATION 4
1968



CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

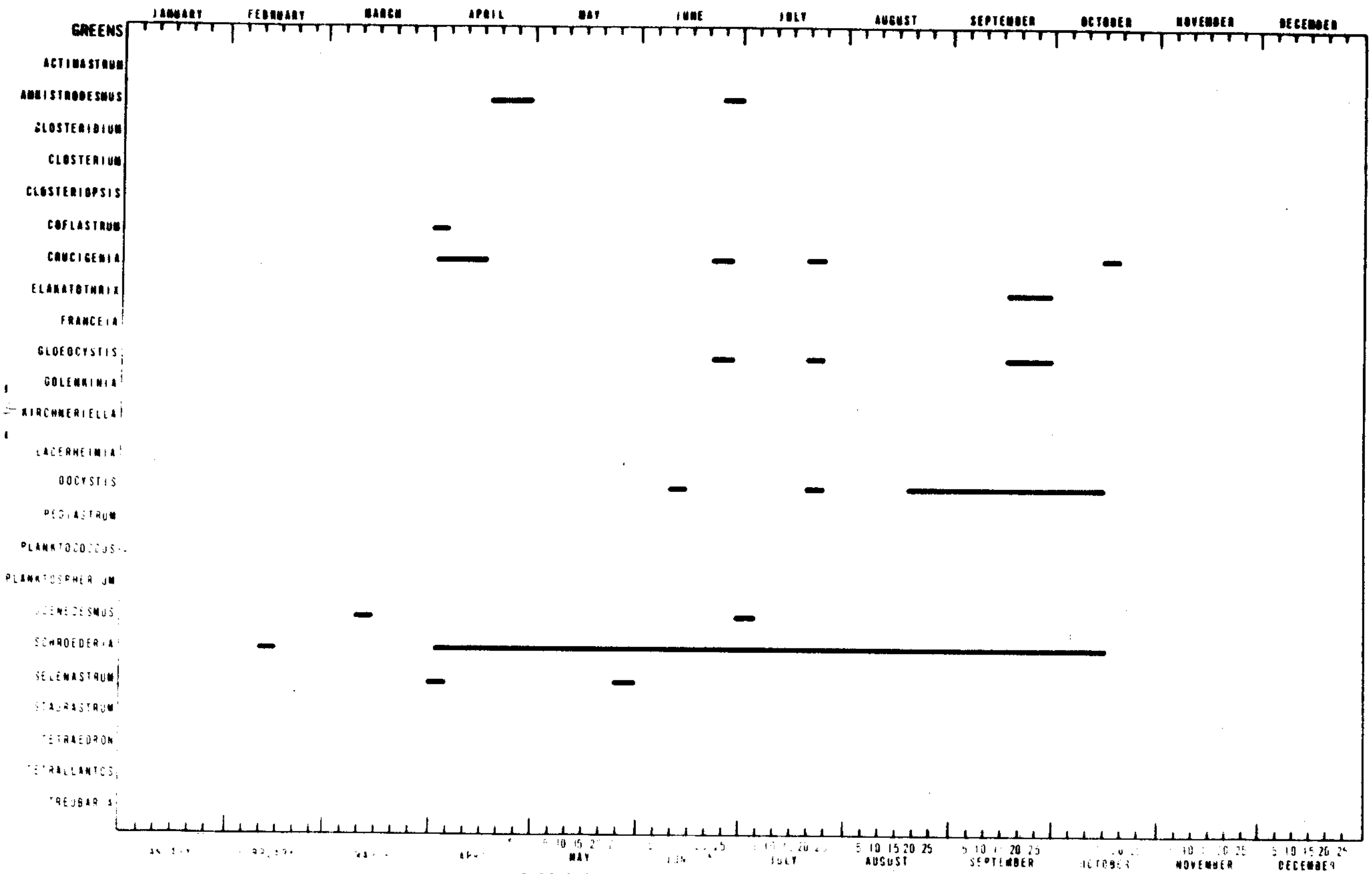

CLEAR LAKE OAKS ARM STATION 4
1968
JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER
GREENS
ACTINASTRUM
ANKISTRODESMUS
CLOSTERIDIUM
CLOSTERIUM
CLOSTERIOPSIS
COELASTRUM
CRUCIGENIA
ELAKATOTHRIX
FRANCEIA
GLOEOCYSTIS
GOLENKINIA
KIRCHNERIELLA
LAGERHEIMIA
OOCYSTIS
PEDIASTRUM
PLANKTOCOCCUS
PLANKTOSPHERIUM
SCENEDESMUS
SCHROEDERIA
SELENASTRUM
STAURASTRUM
TETRAEDRON
TETRALLANTOS
TREUBARIA
5 10 15 20 25
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE UPPER ARM STATION 1
1969



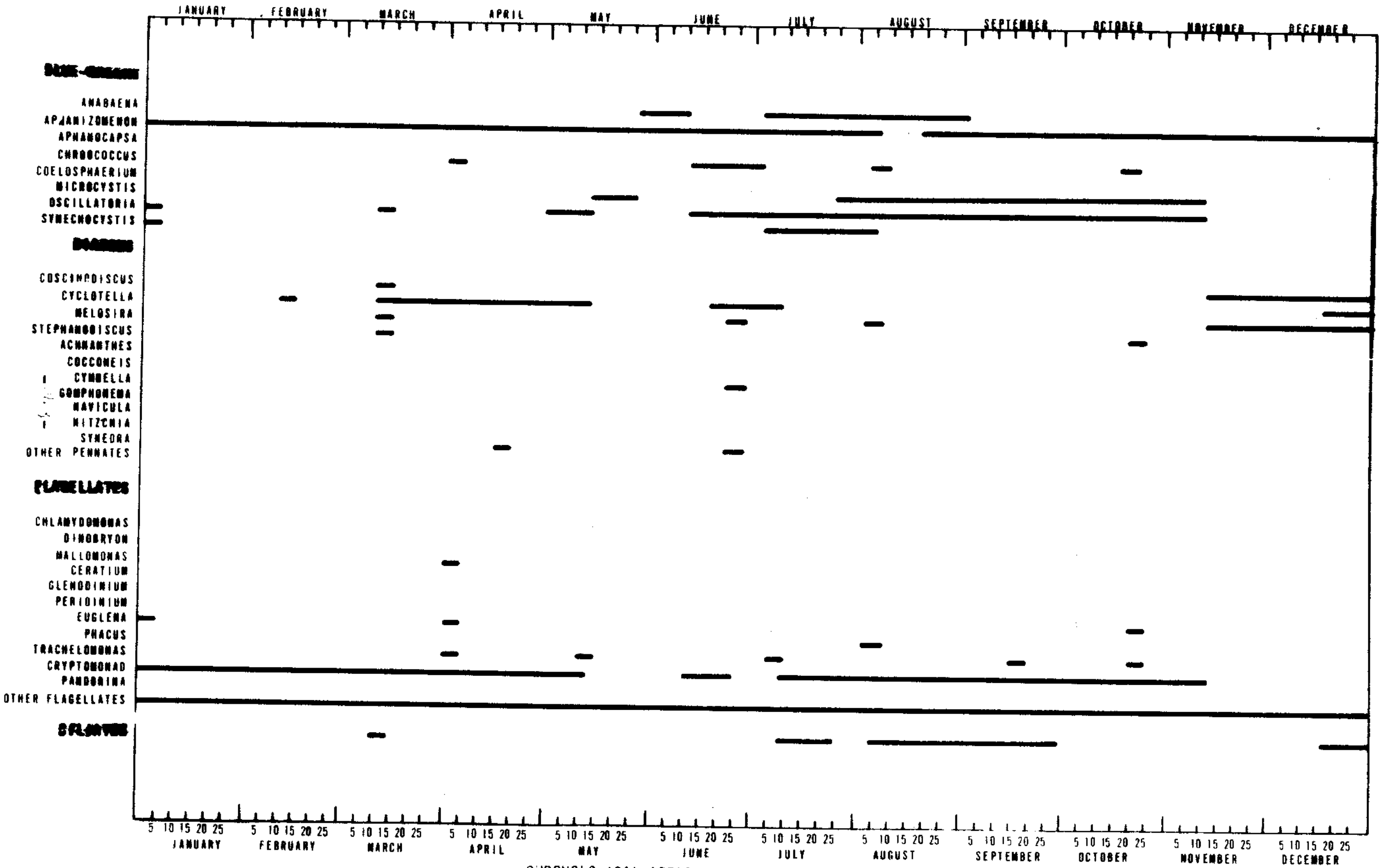
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE UPPER ARM STATION 1
1969

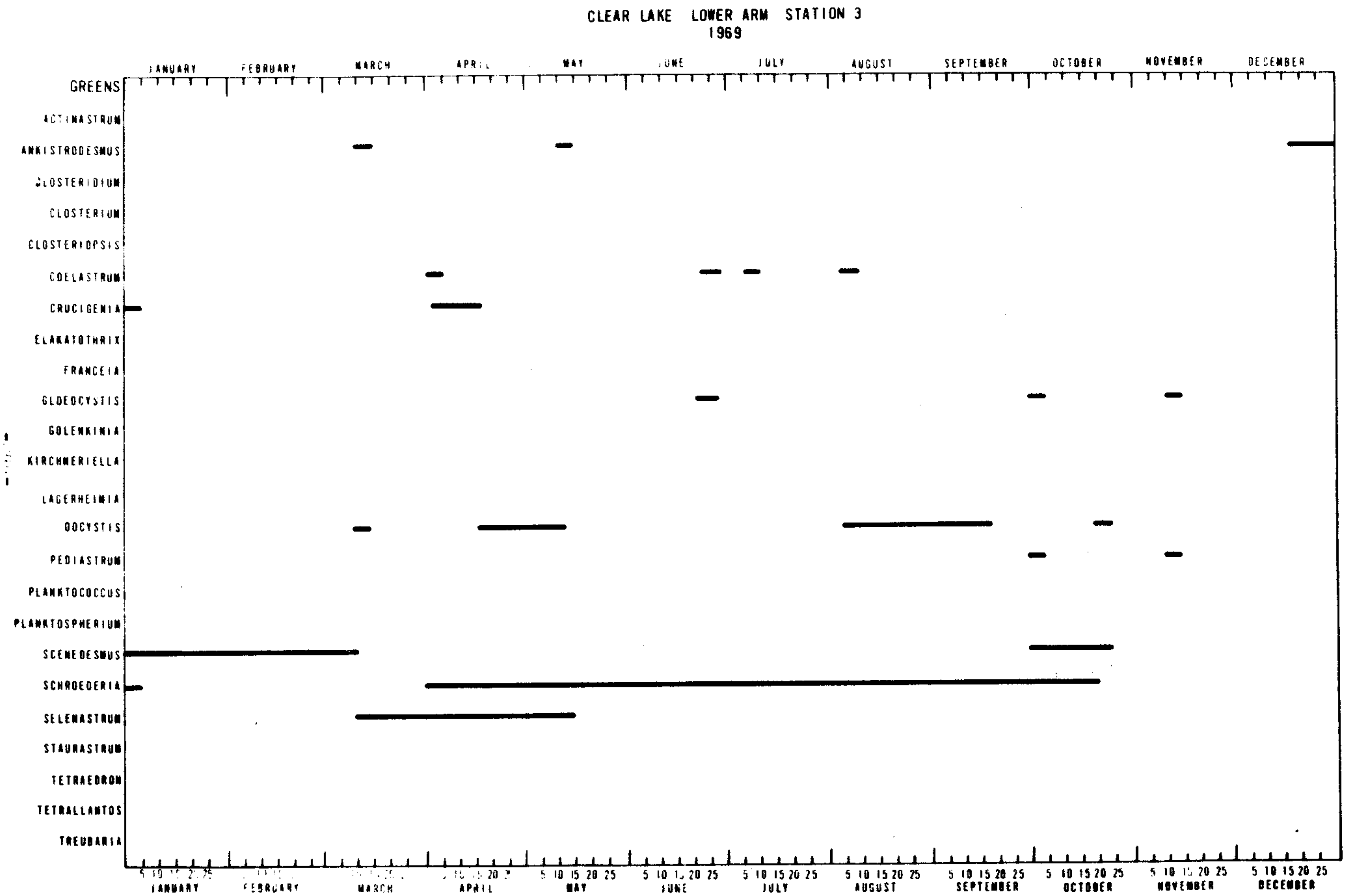


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE LOWER ARM STATION 3
1969

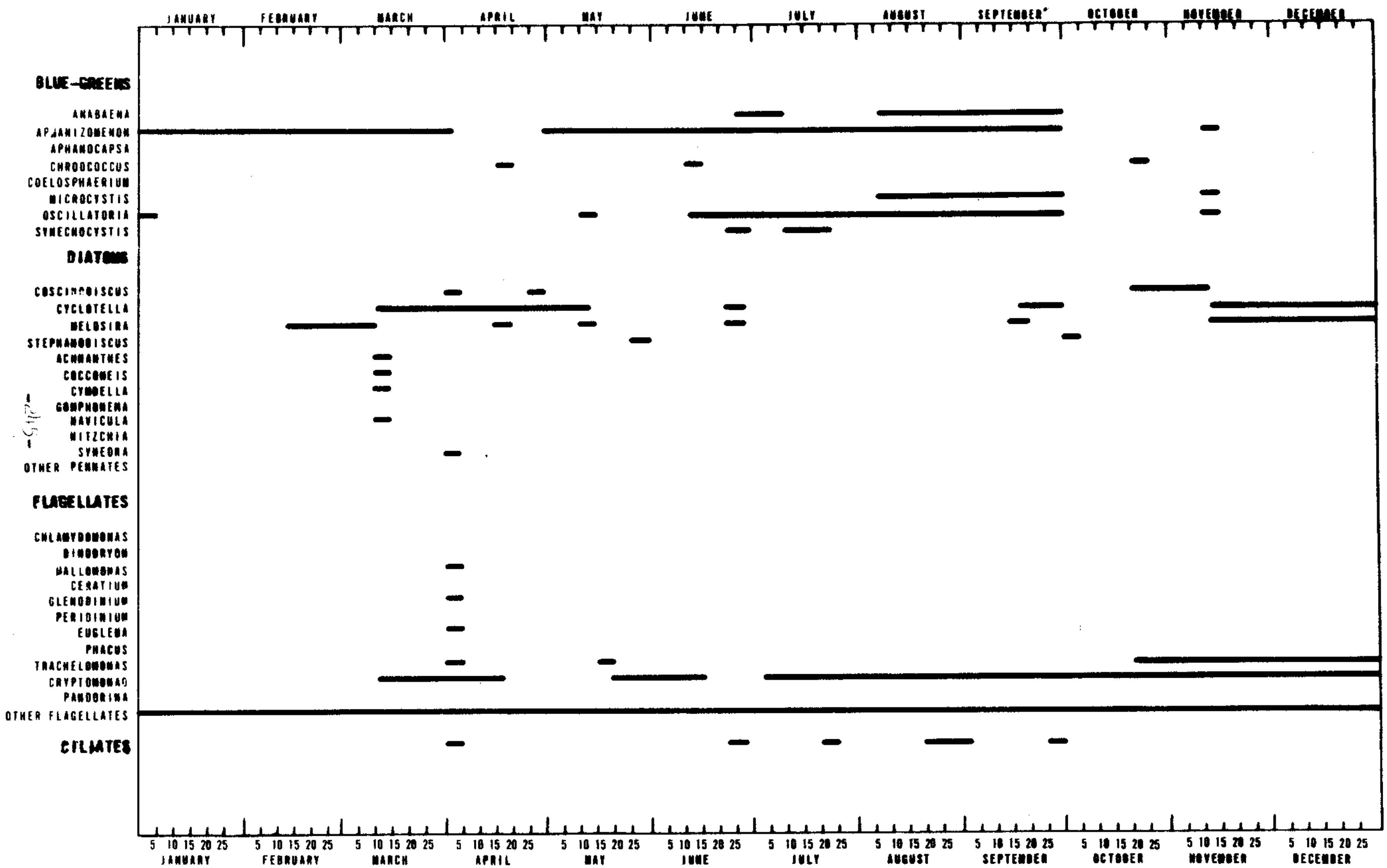


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES



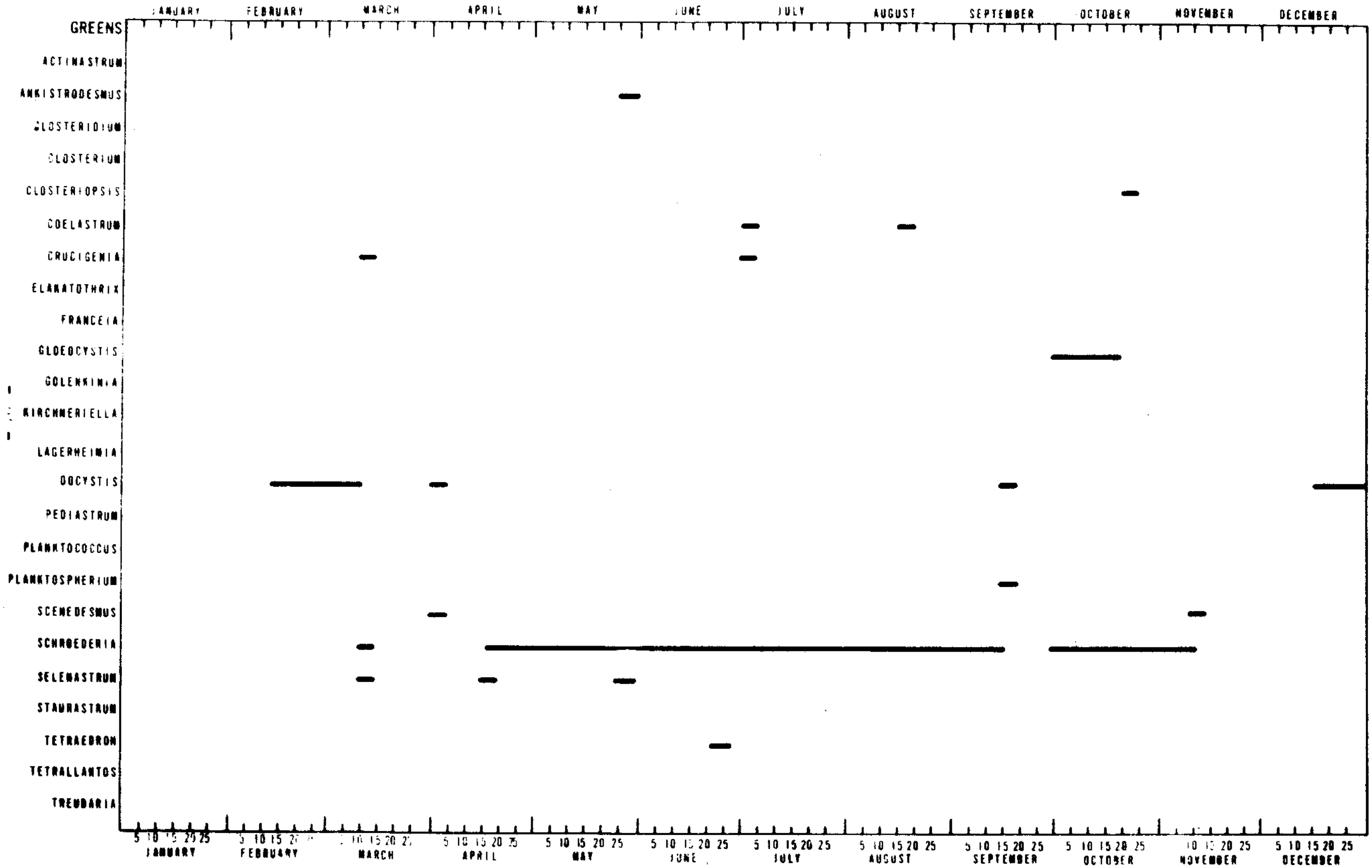
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE OAKS ARM STATION 4
1969

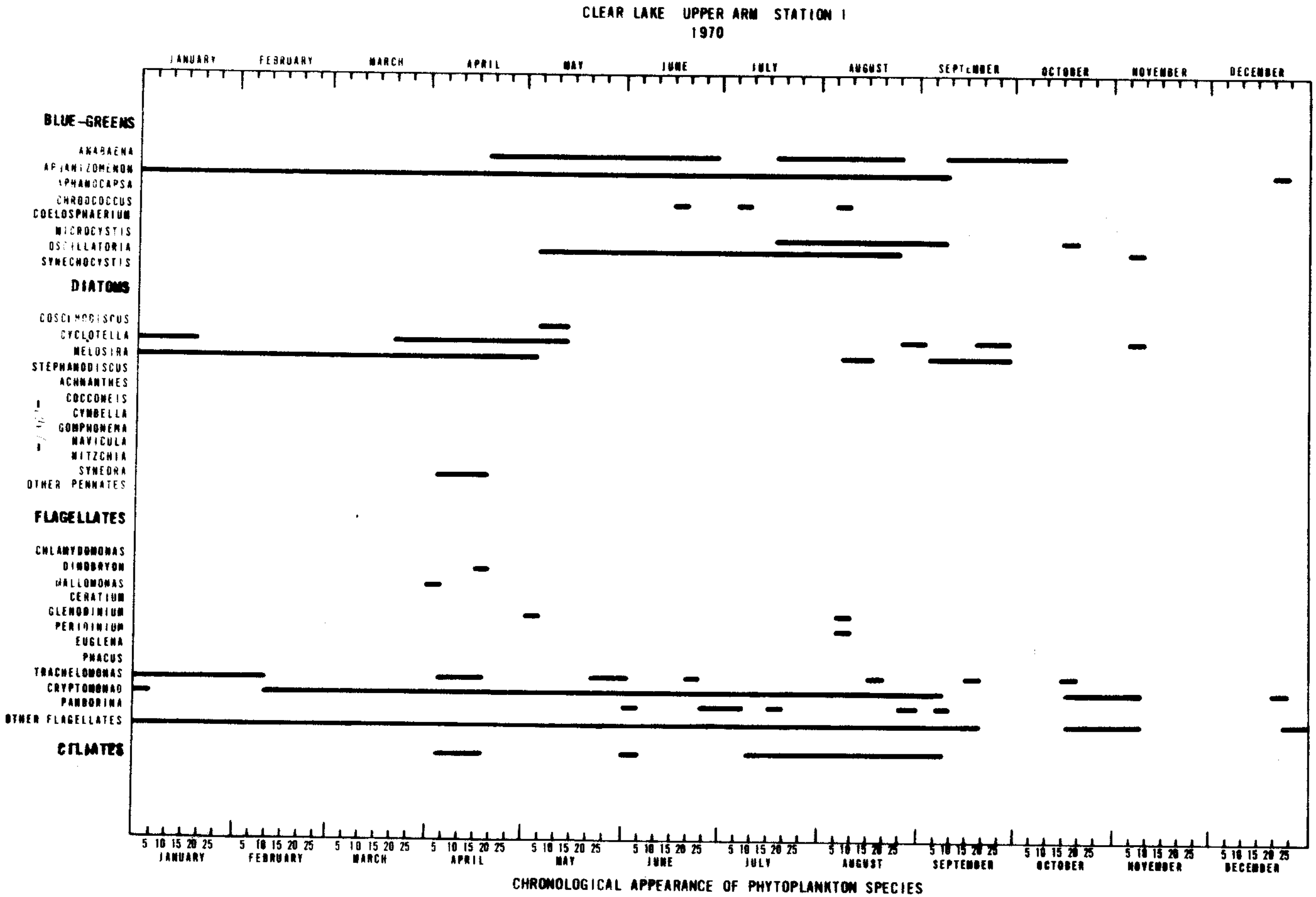


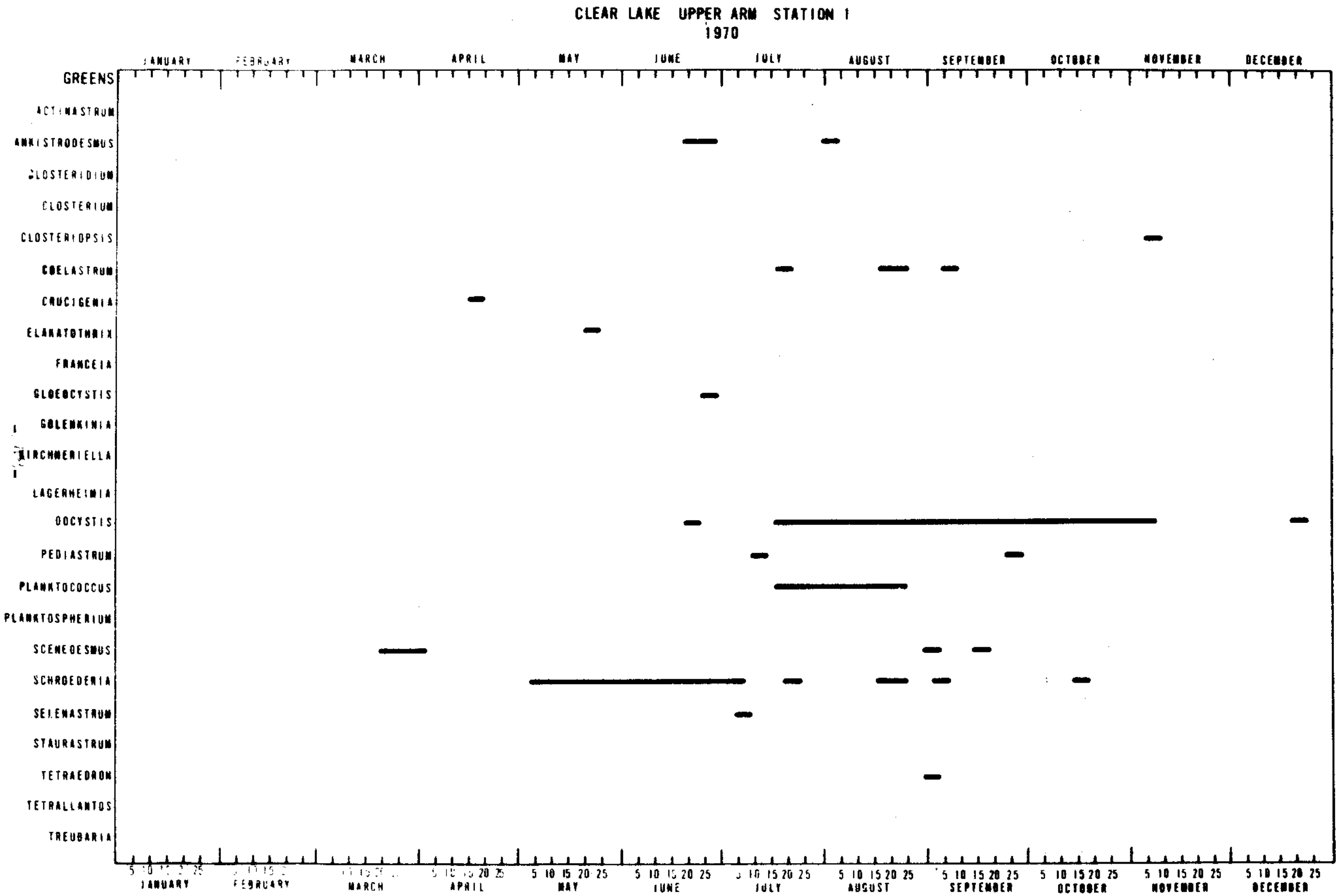
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE OAKS ARM STATION 4
1969

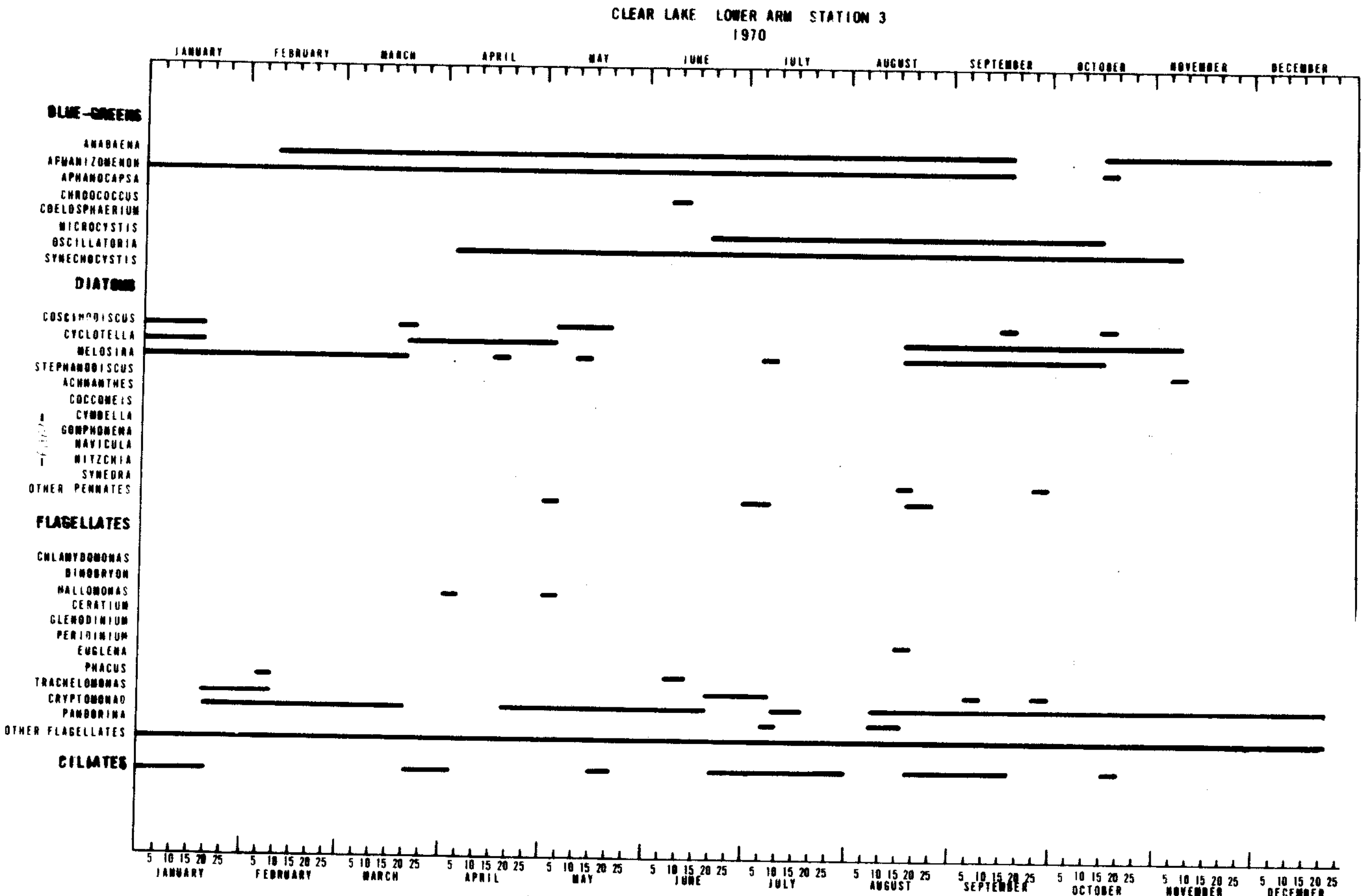


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES


CLEAR LAKE UPPER ARM STATION I
1970
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
BLUE-GREENS
ANABAENA
APHANIZOMENON
APHANOCAPSA
CHROOCOCCUS
COELOSPHAERIUM
MICROCYSTIS
OSCILLATORIA
SYNECHOCYSTIS
DIATOMS
COSCINODISCUS
CYCLOTELLA
MELOSIRA
STEPHANODISCUS
ACHNANTHES
COCCONEIS
CYMBELLA
GOMPHONEMA
NAVICULA
NITZCHIA
SYNEDRA
OTHER PENNATES
FLAGELLATES
CHLAMYDOMONAS
DINOBRYON
MALLOMONAS
CERATIUM
GLENODINIUM
PERIDINIUM
EUGLENA
PHACUS
TRACHELOMONAS
CRYPTOMONAD
PANDORINA
OTHER FLAGELLATES
CILIATES
5 10 15 20 25
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

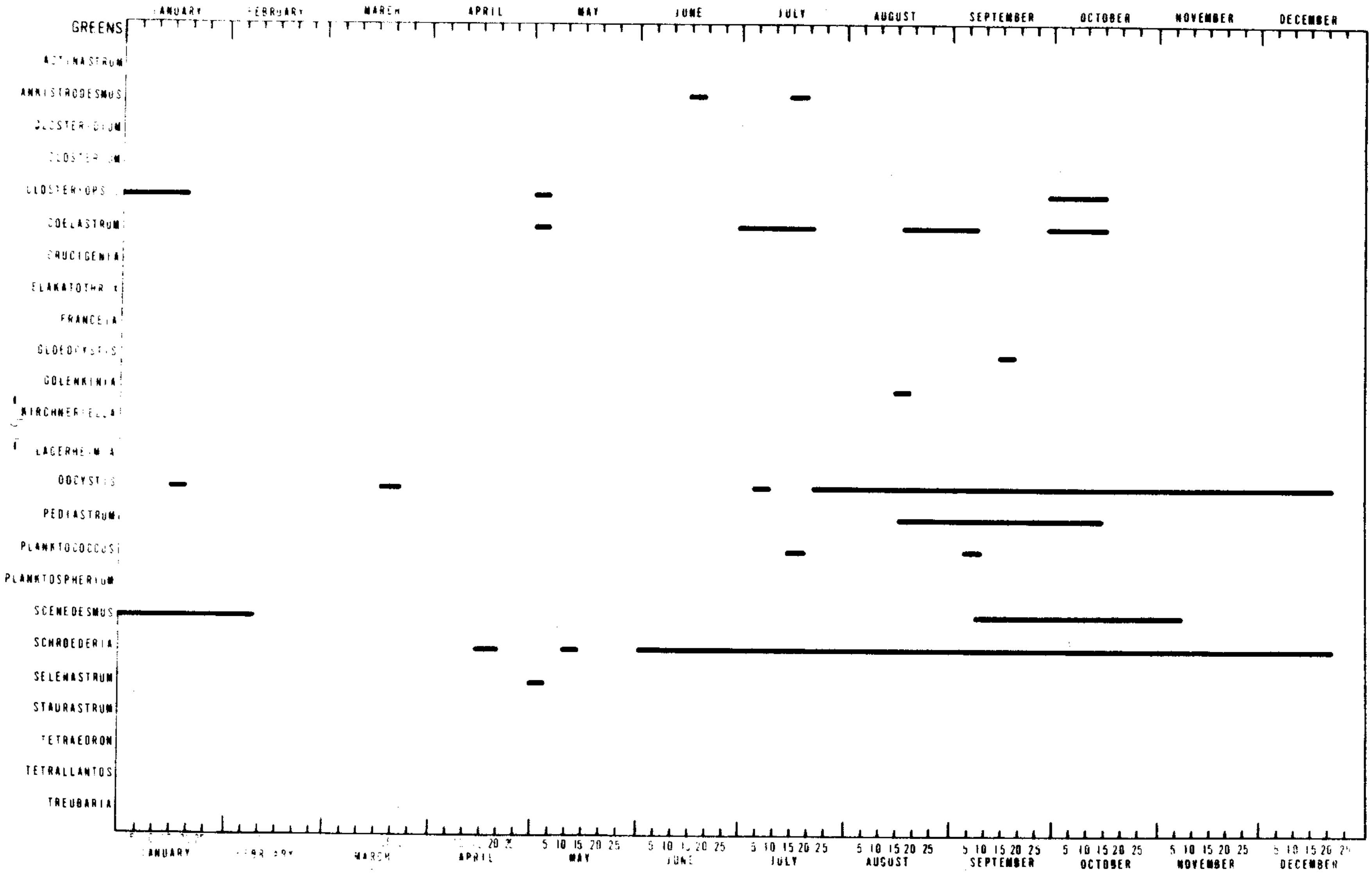


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES



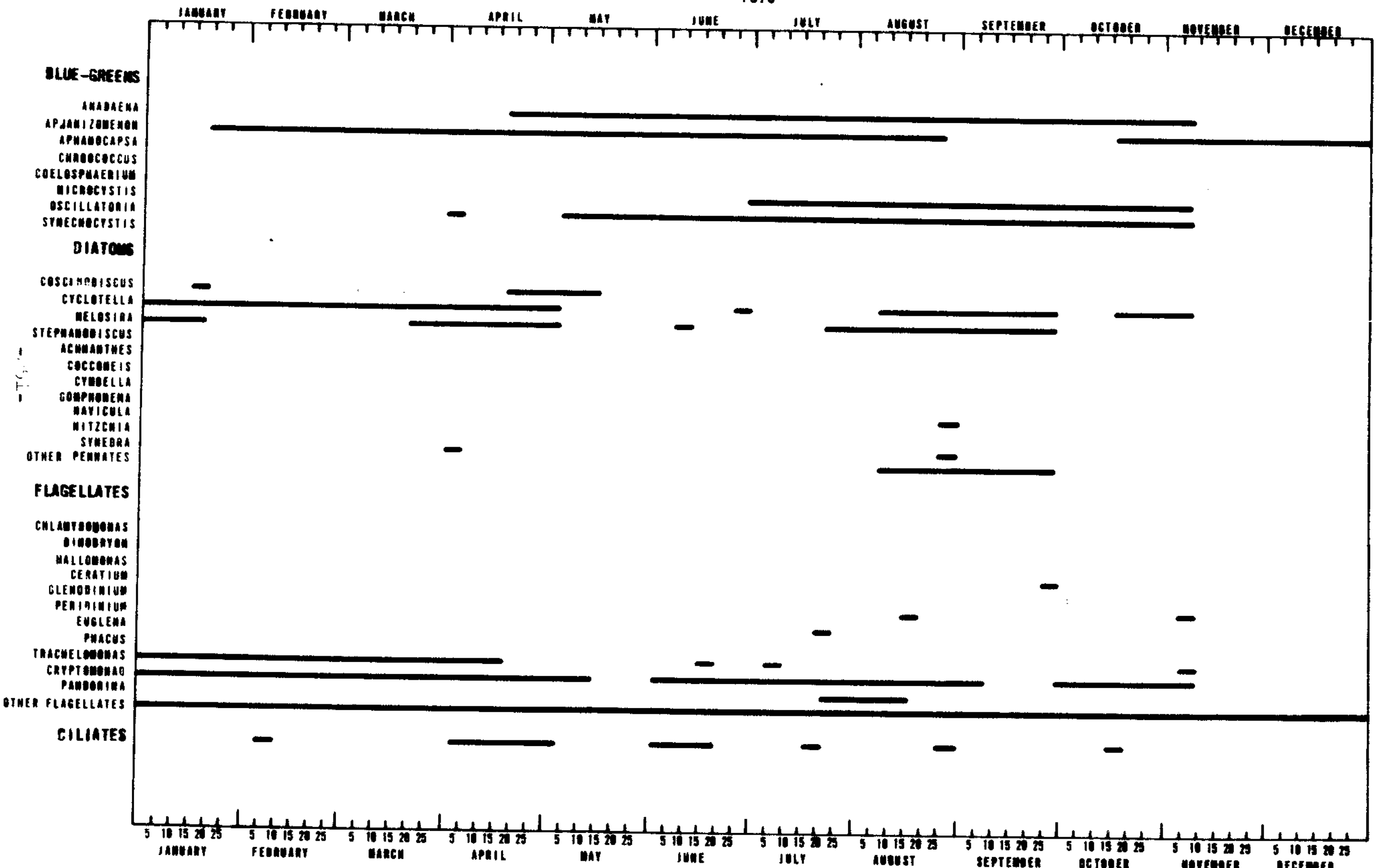
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE LOWER ARM STATION 3
1970



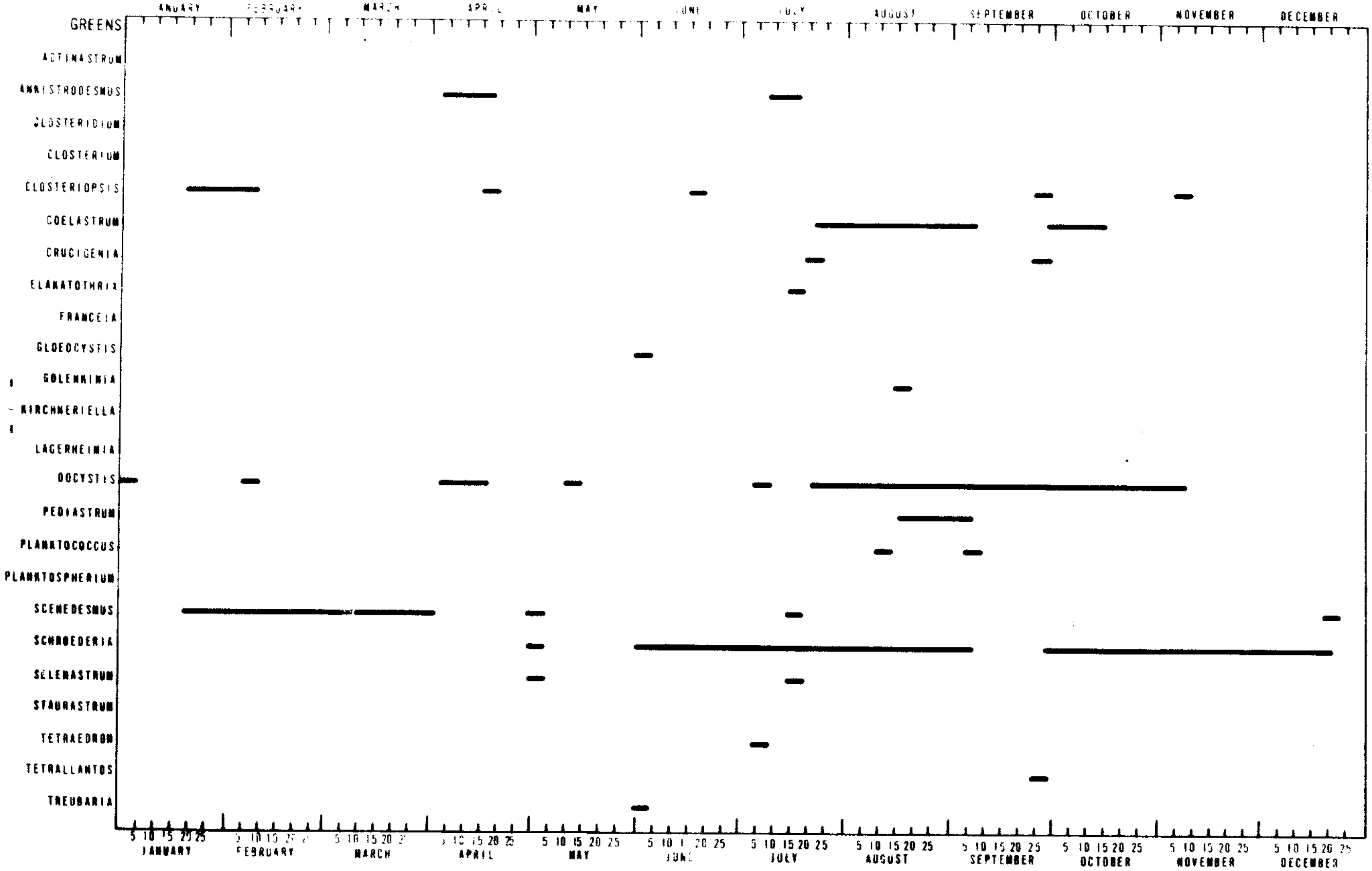
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE OAKS ARM STATION 4
1970

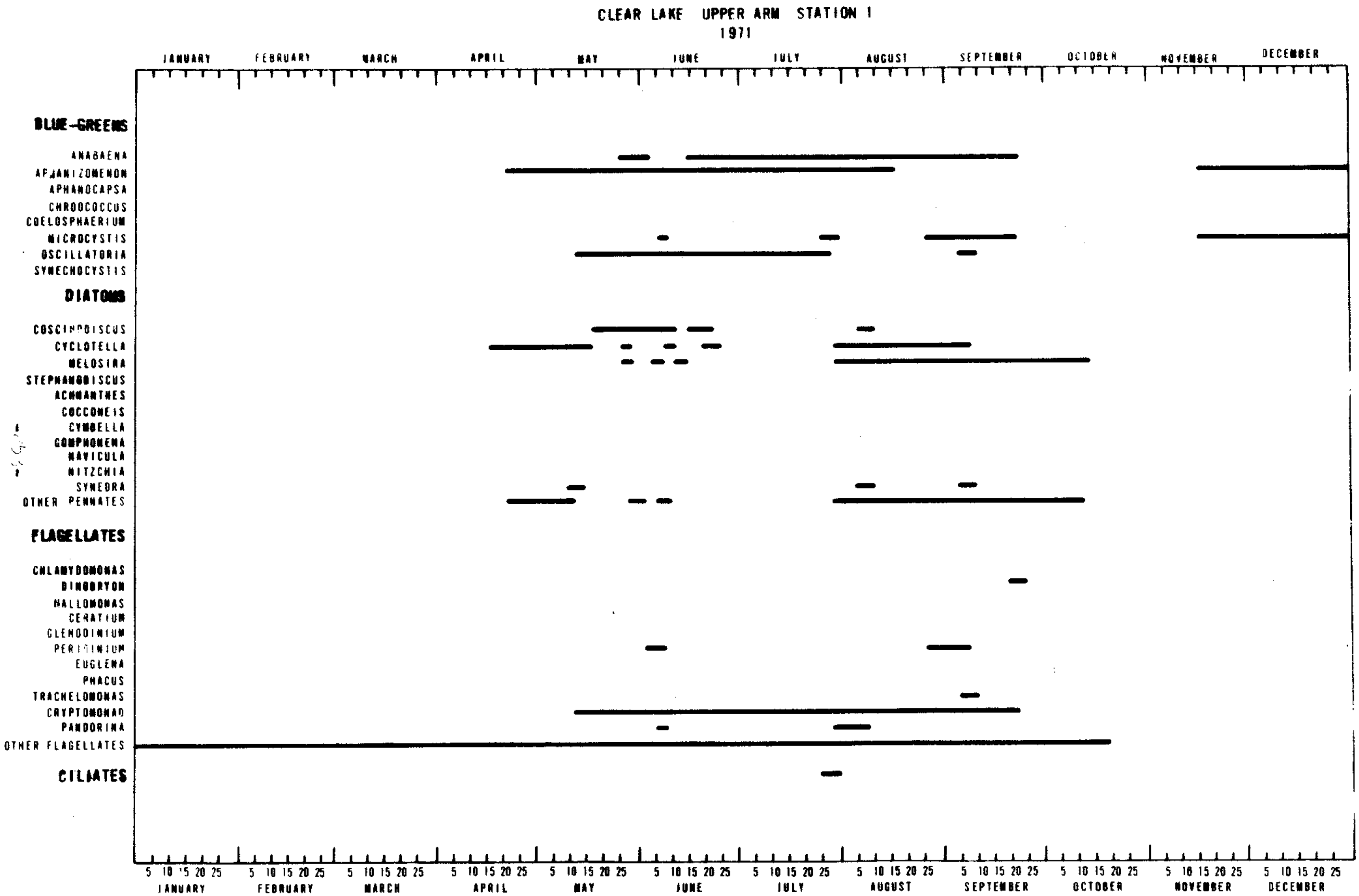


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

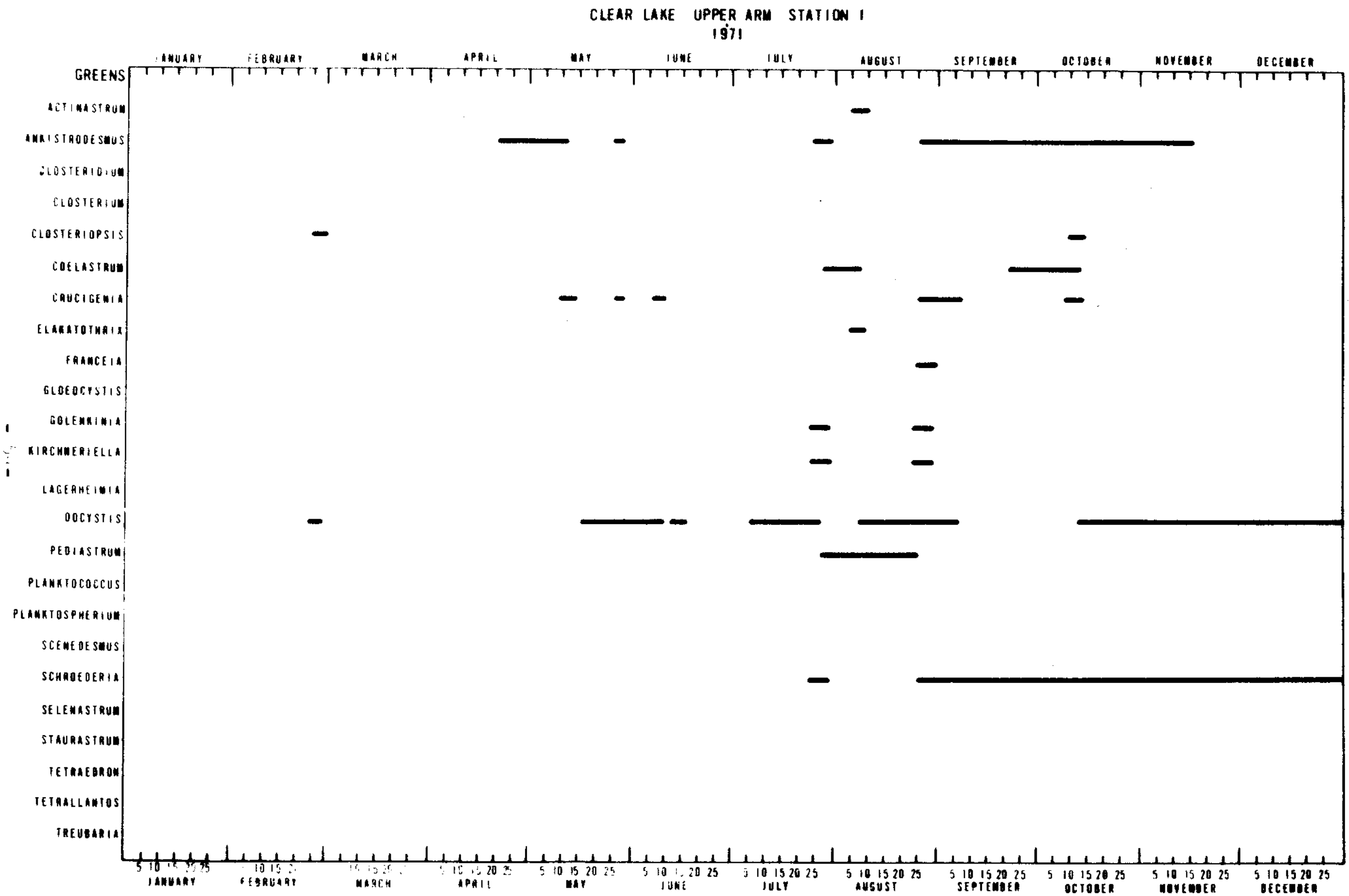
CLEAR LAKE OAKS ARM STATION 4
1970



CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

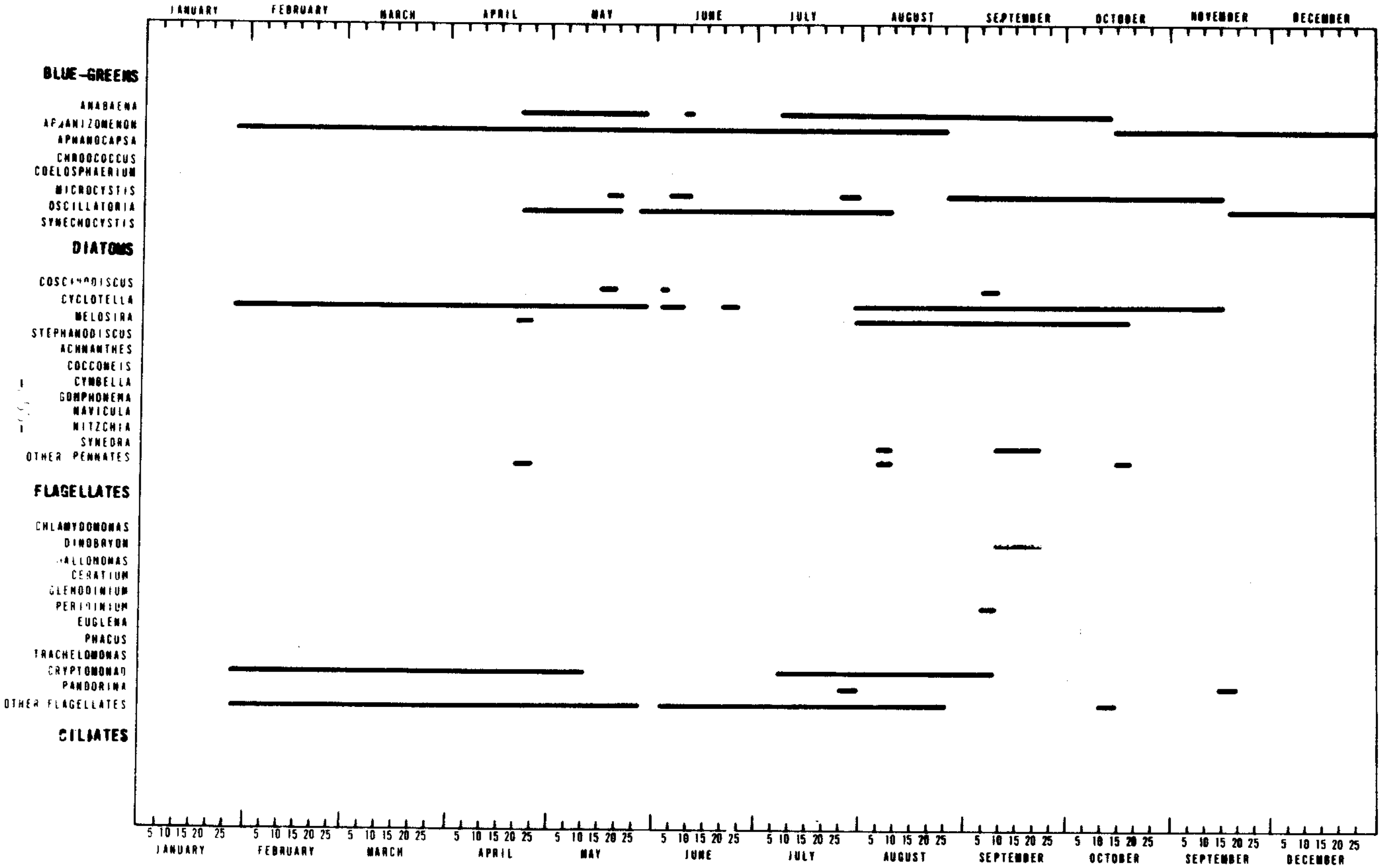


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

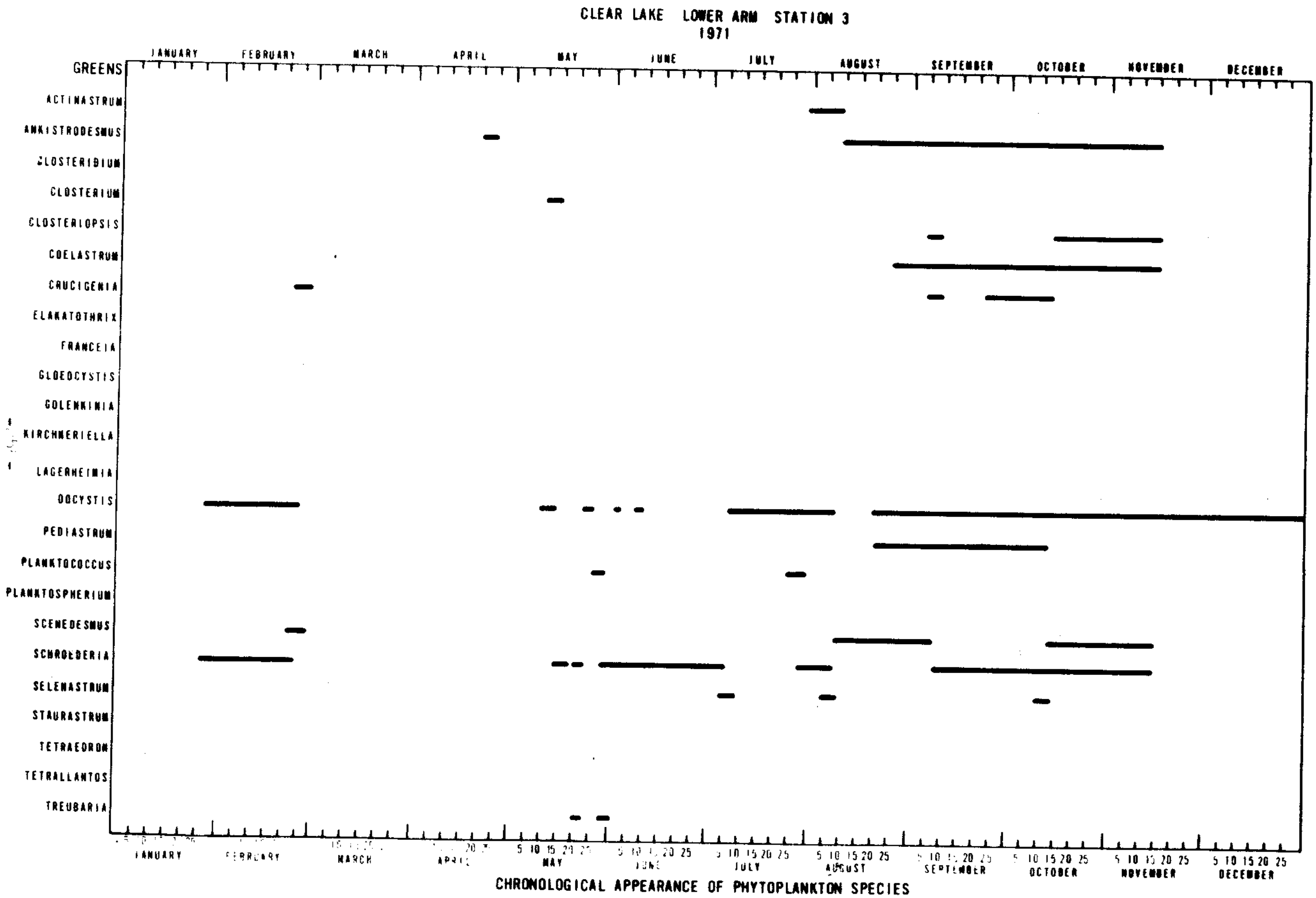


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

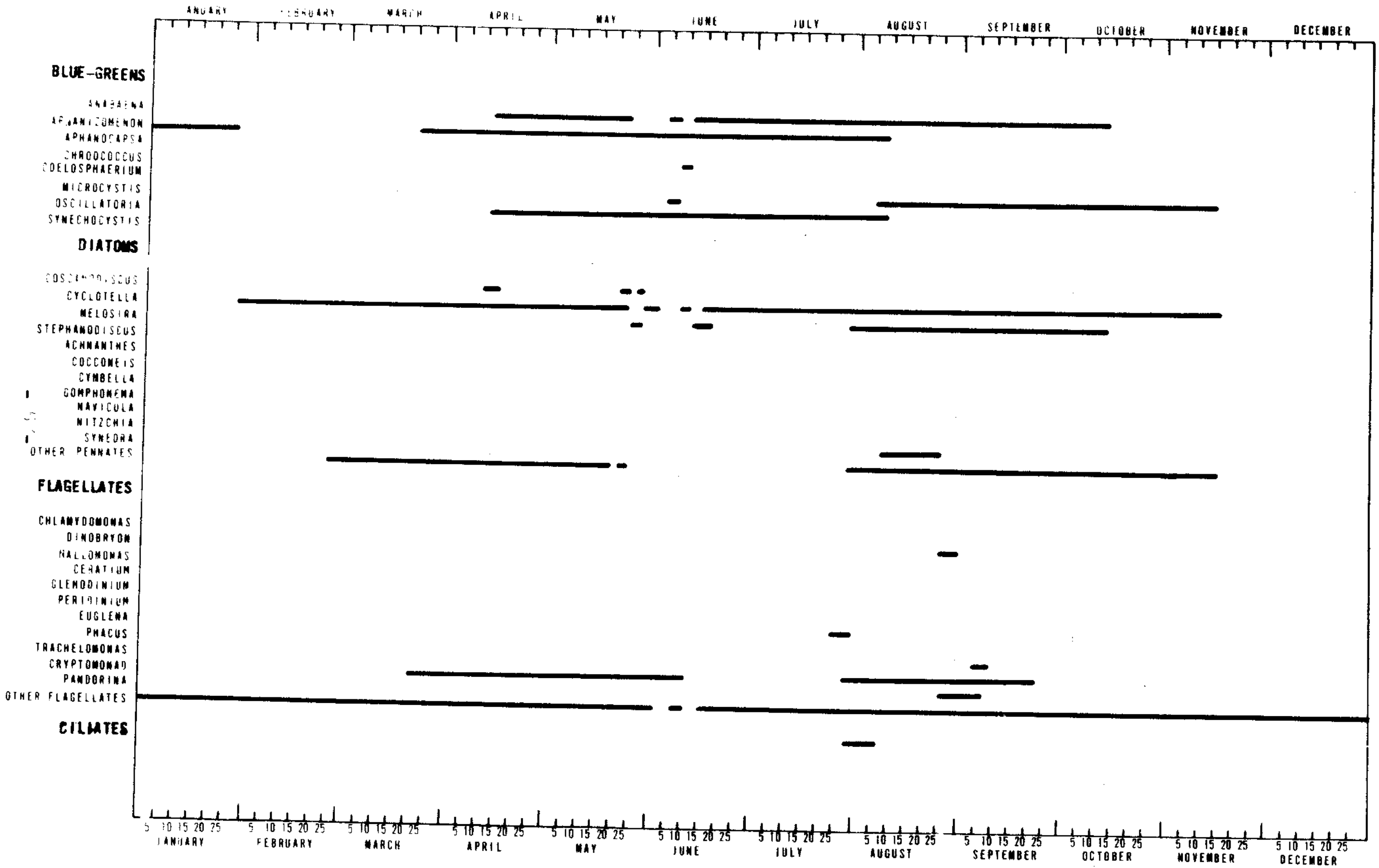
CLEAR LAKE LOWER ARM STATION 3
1971



CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

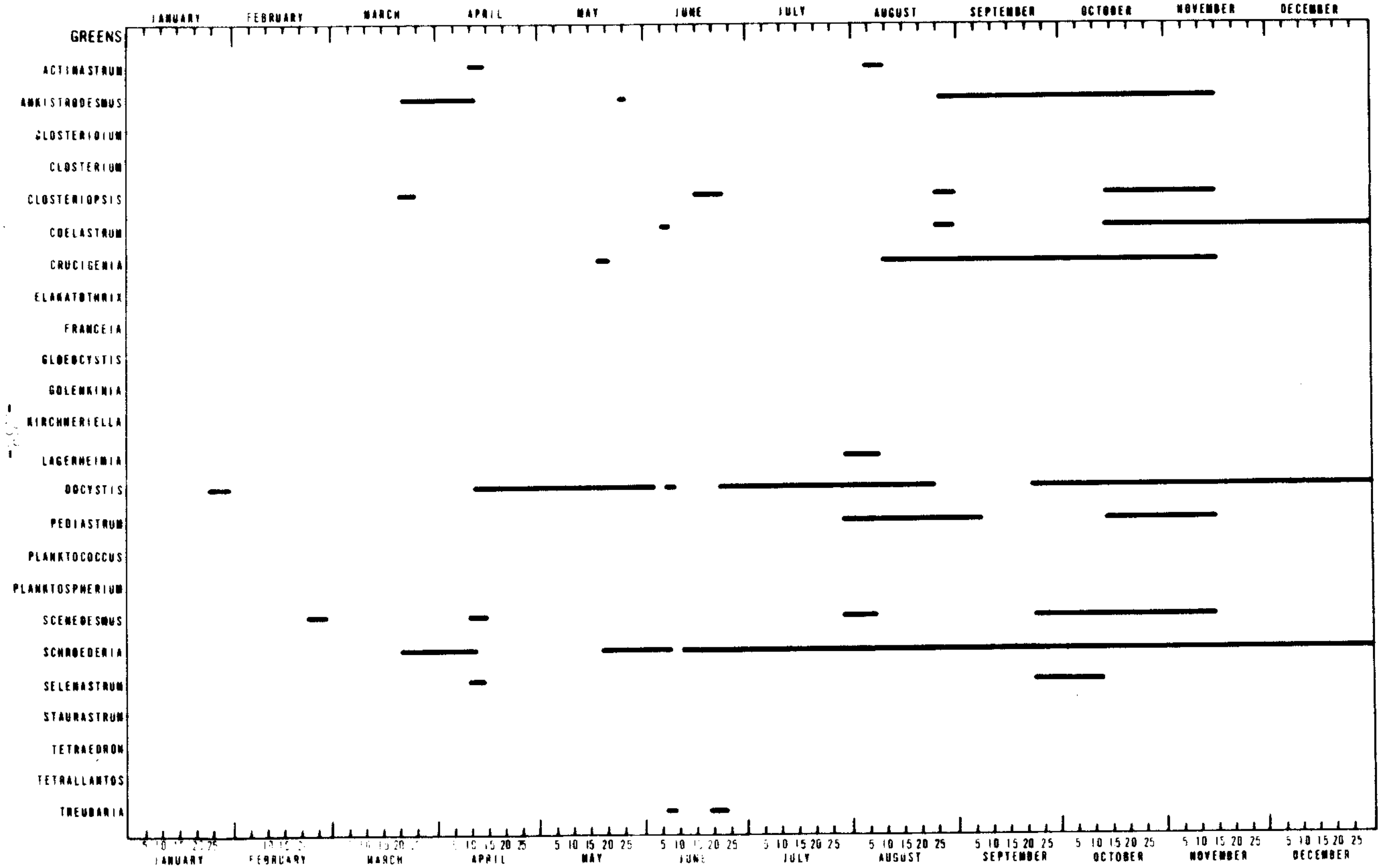

CLEAR LAKE LOWER ARM STATION 3
1971
GREENS
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
ACTINASTRUM
ANKISTRODESMUS
CLOSTERIDIUM
CLOSTERIUM
CLOSTERIOPSIS
COELASTRUM
CRUCIGENIA
ELAKATOTHRIX
FRANCEIA
GLOEOCYSTIS
GOLENKINIA
KIRCHNERIELLA
LAGERHEIMIA
OOCYSTIS
PEDIASTRUM
PLANKTOCOCCUS
PLANKTOSPHERIUM
SCENEDESMUS
SCHROEDERIA
SELENASTRUM
STAURASTRUM
TETRAEDRON
TETRALLANTOS
TREUBARIA
5 10 15 20 25
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE OAKS ARM STATION 4
1971



CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

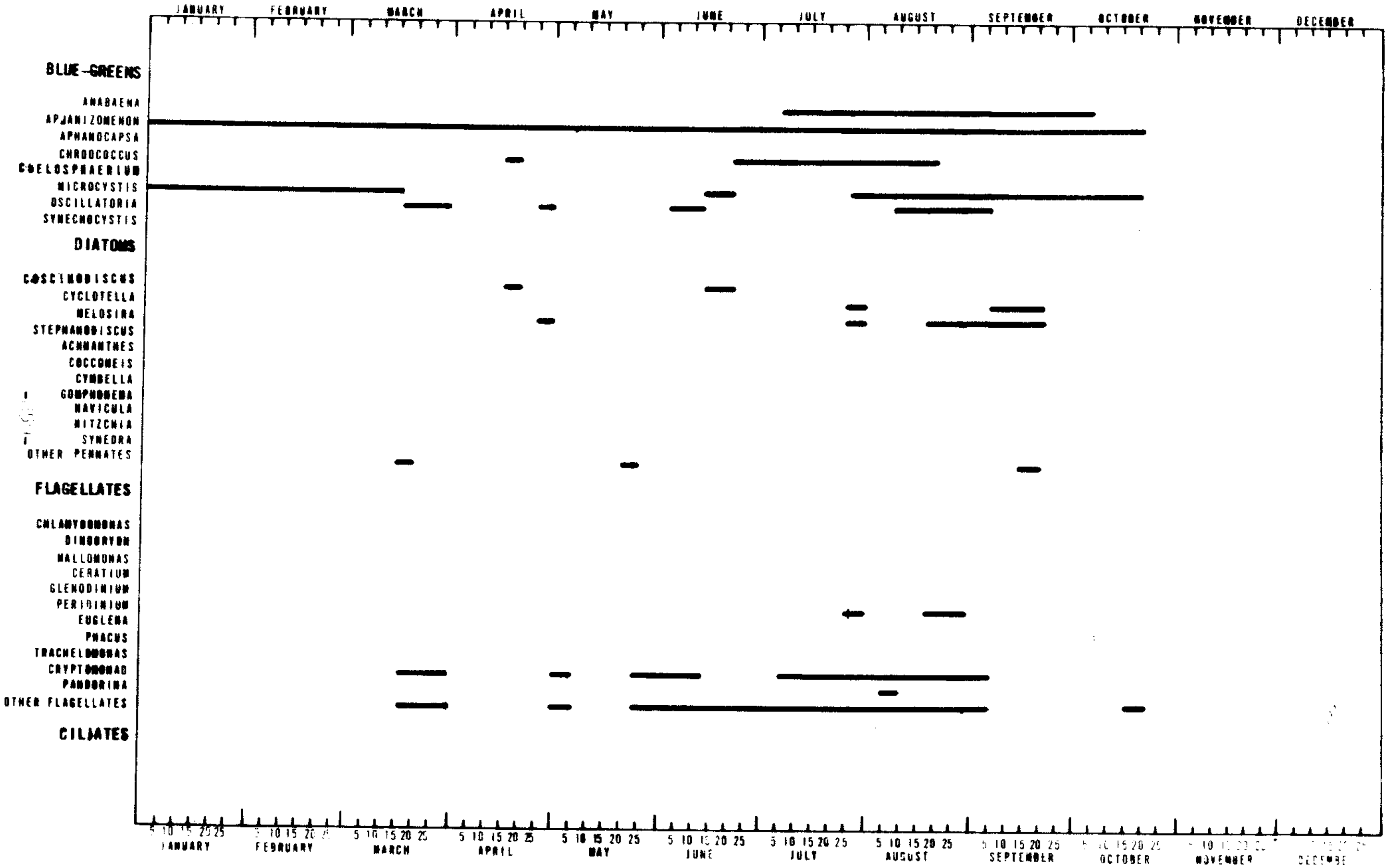
CLEAR LAKE OAKS ARM STATION 4
1971



CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

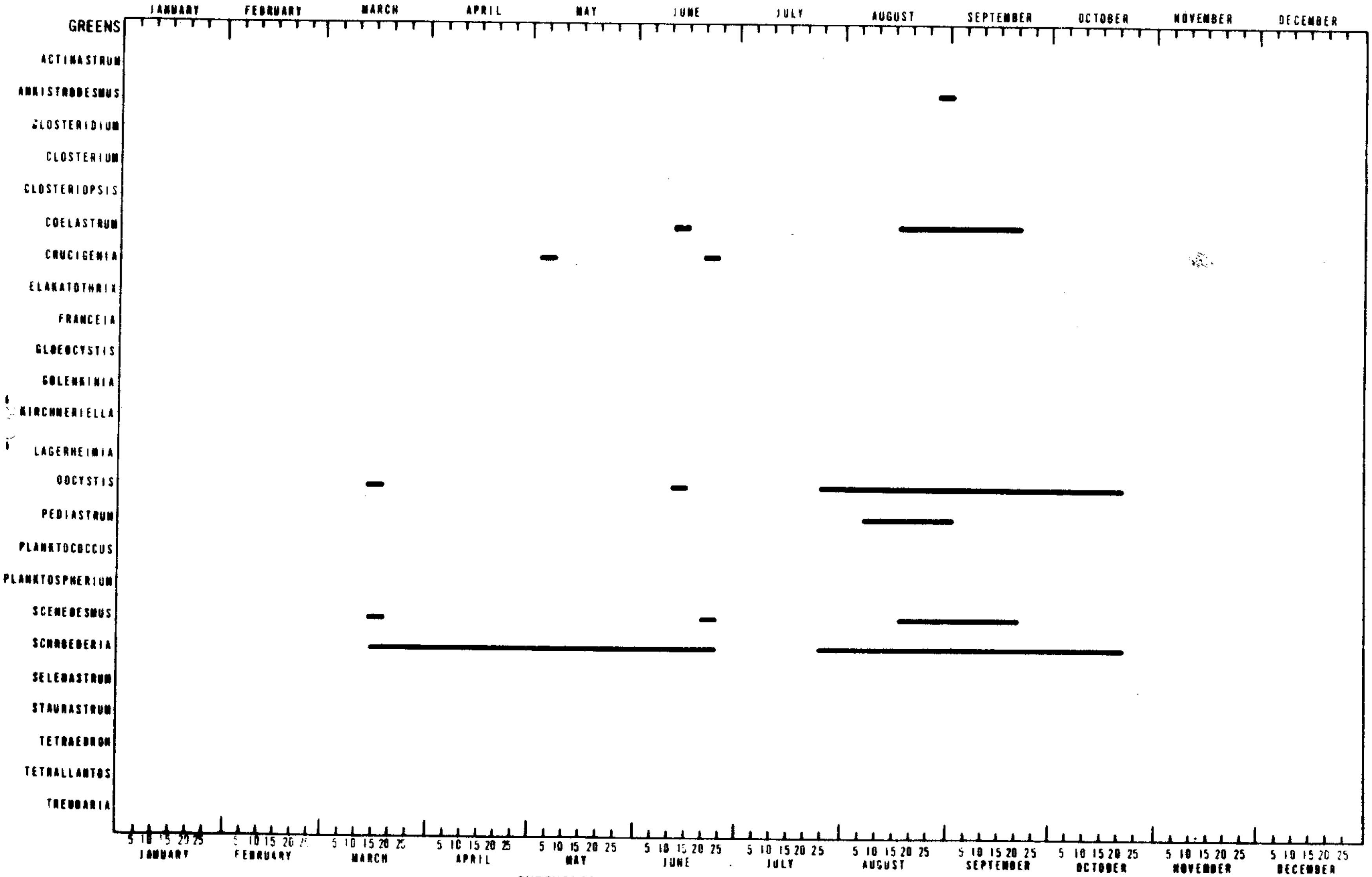
CLEAR LAKE UPPER ARM STATION I

1972

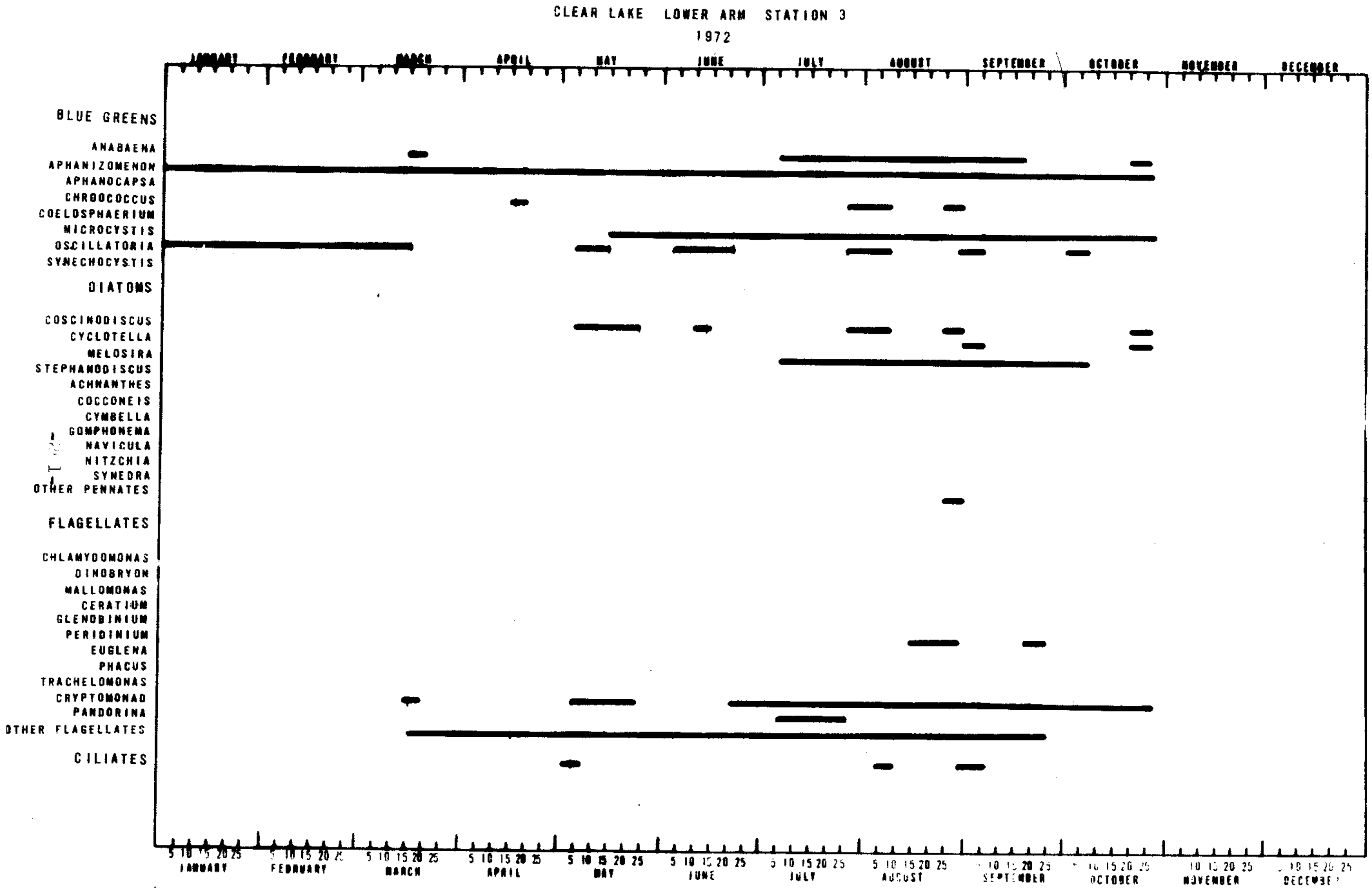


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE UPPER ARM STATION 1
1972

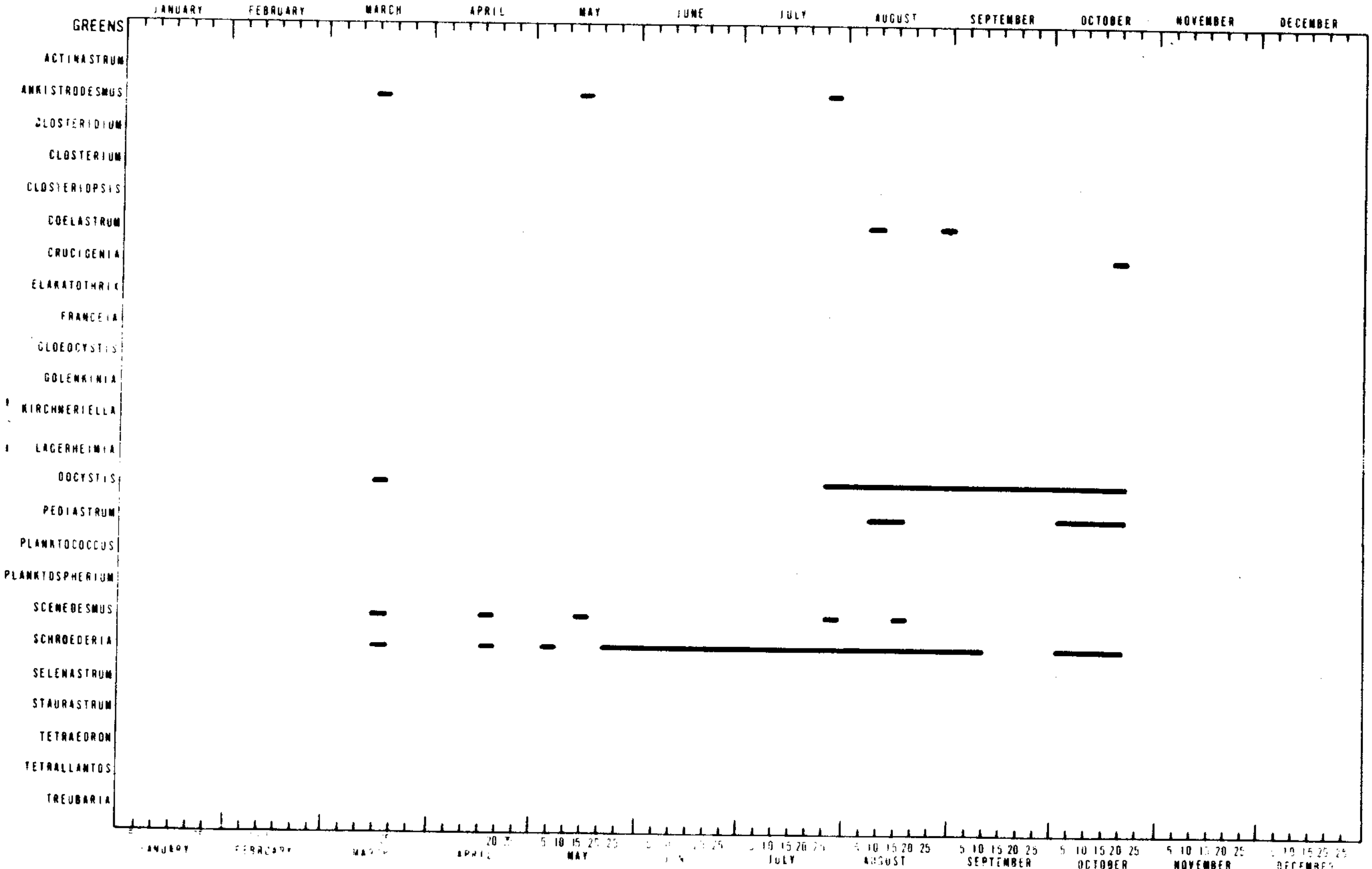


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES



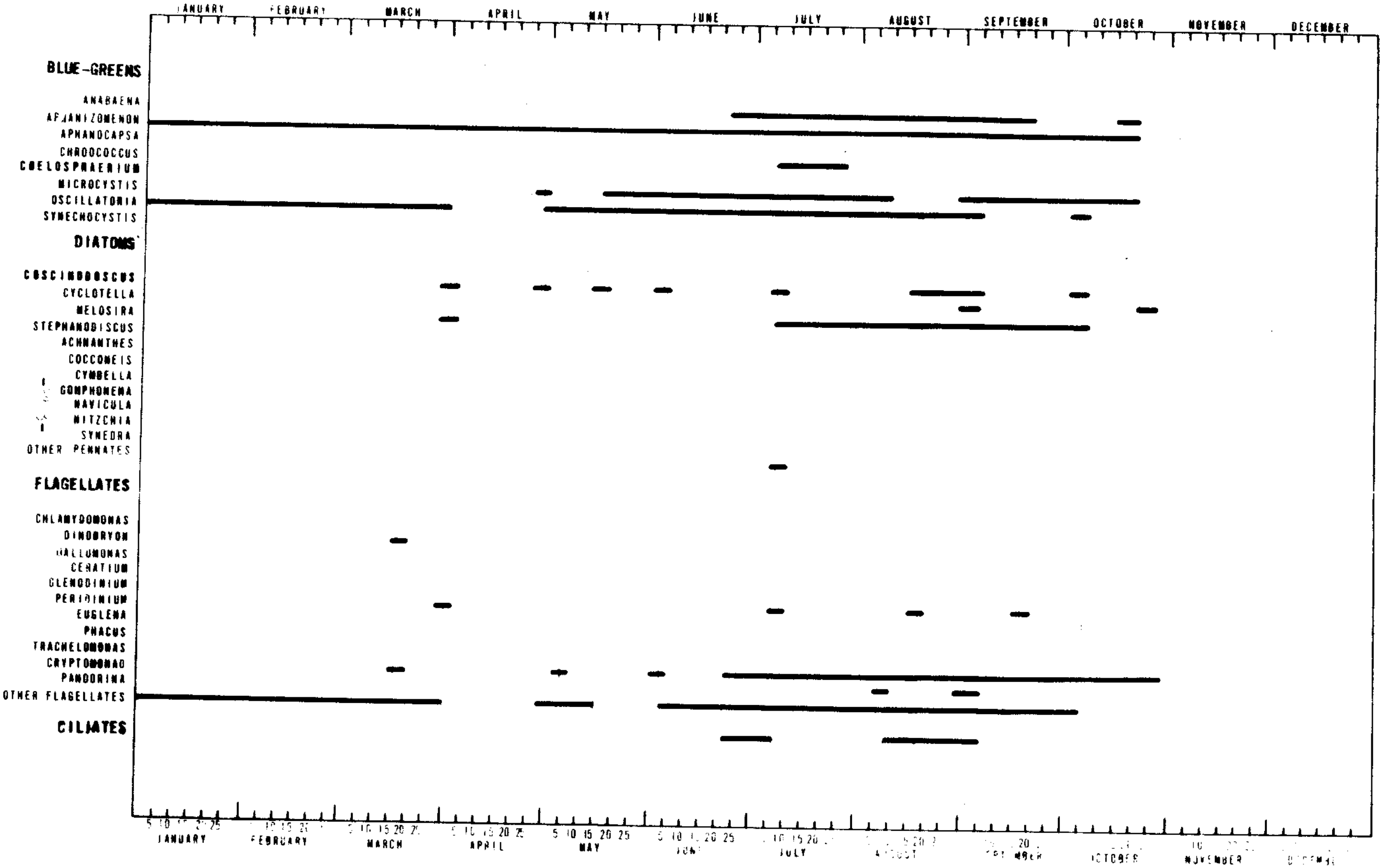
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE LOWER ARM STATION 3
1972

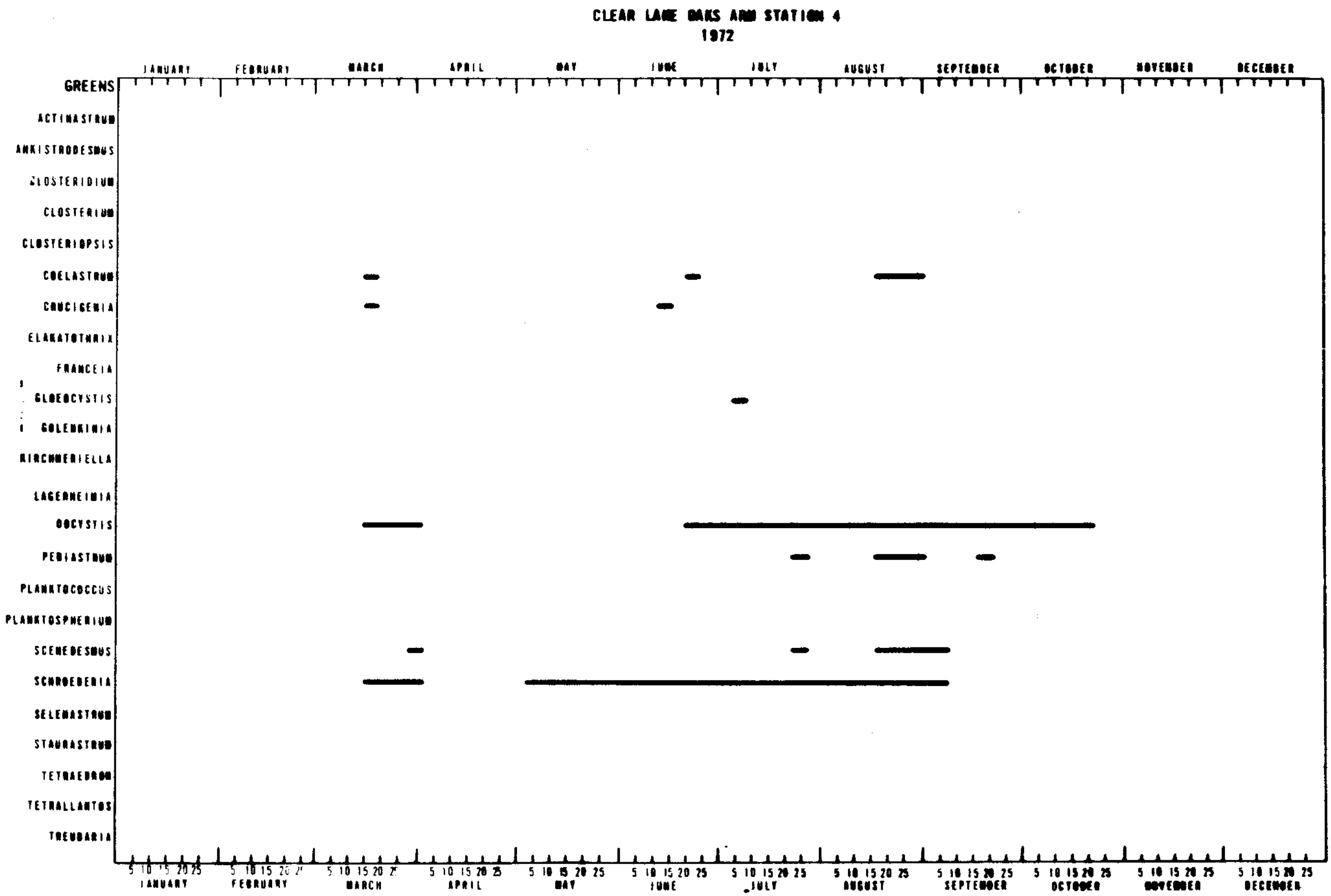


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE OAKS ARM STATION 4
1972

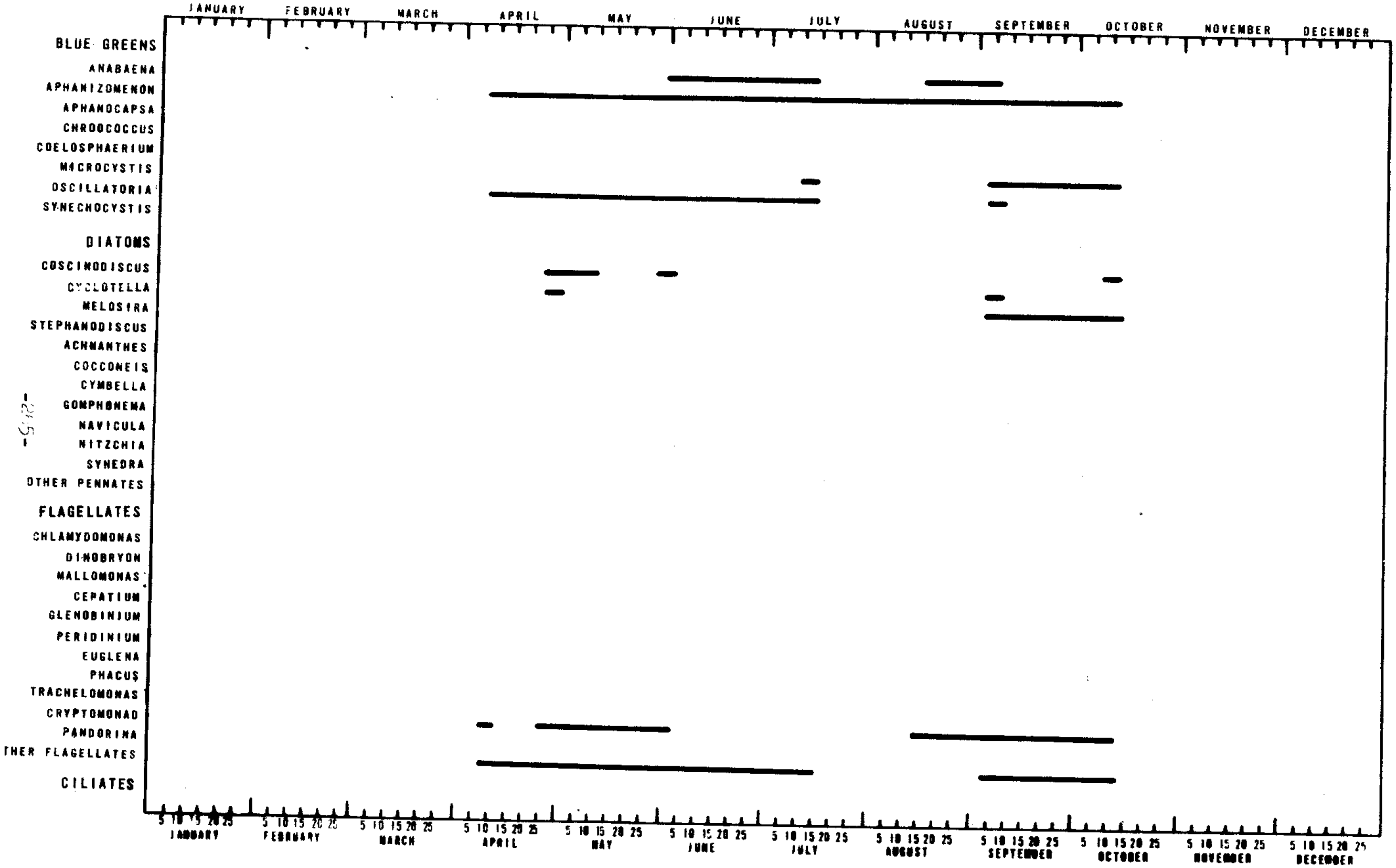


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES



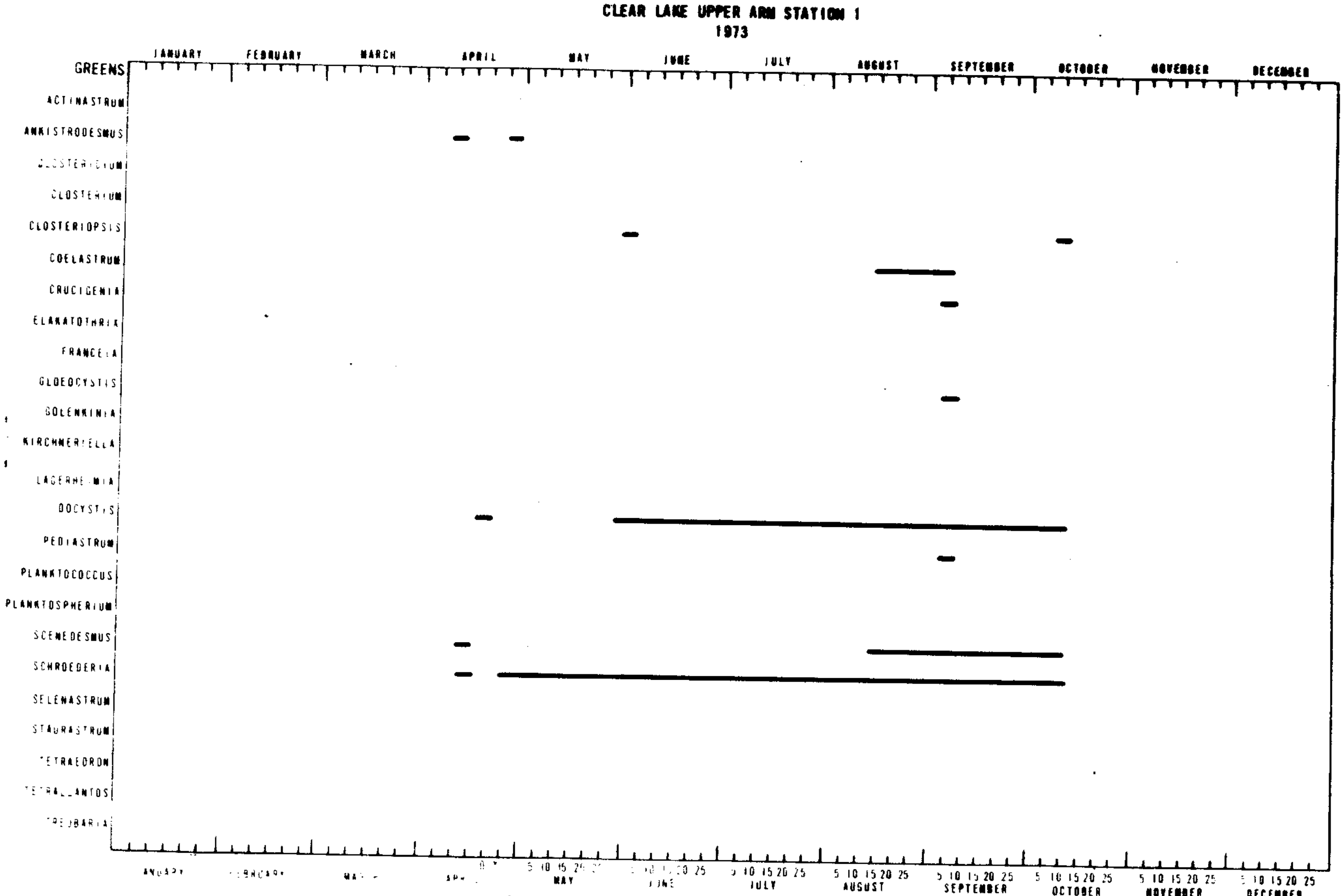
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE UPPER ARM STATION 1
1973



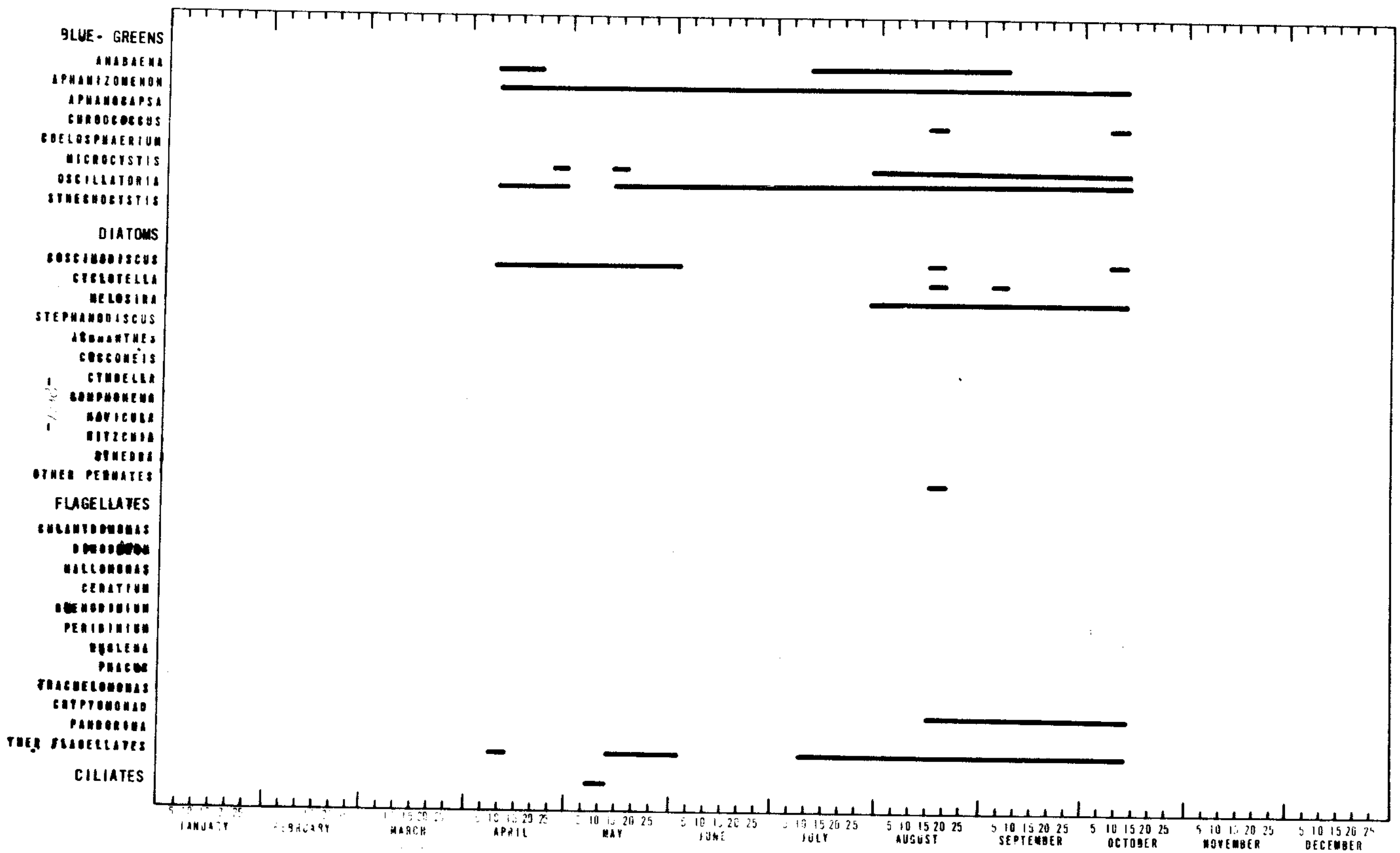
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

-265-



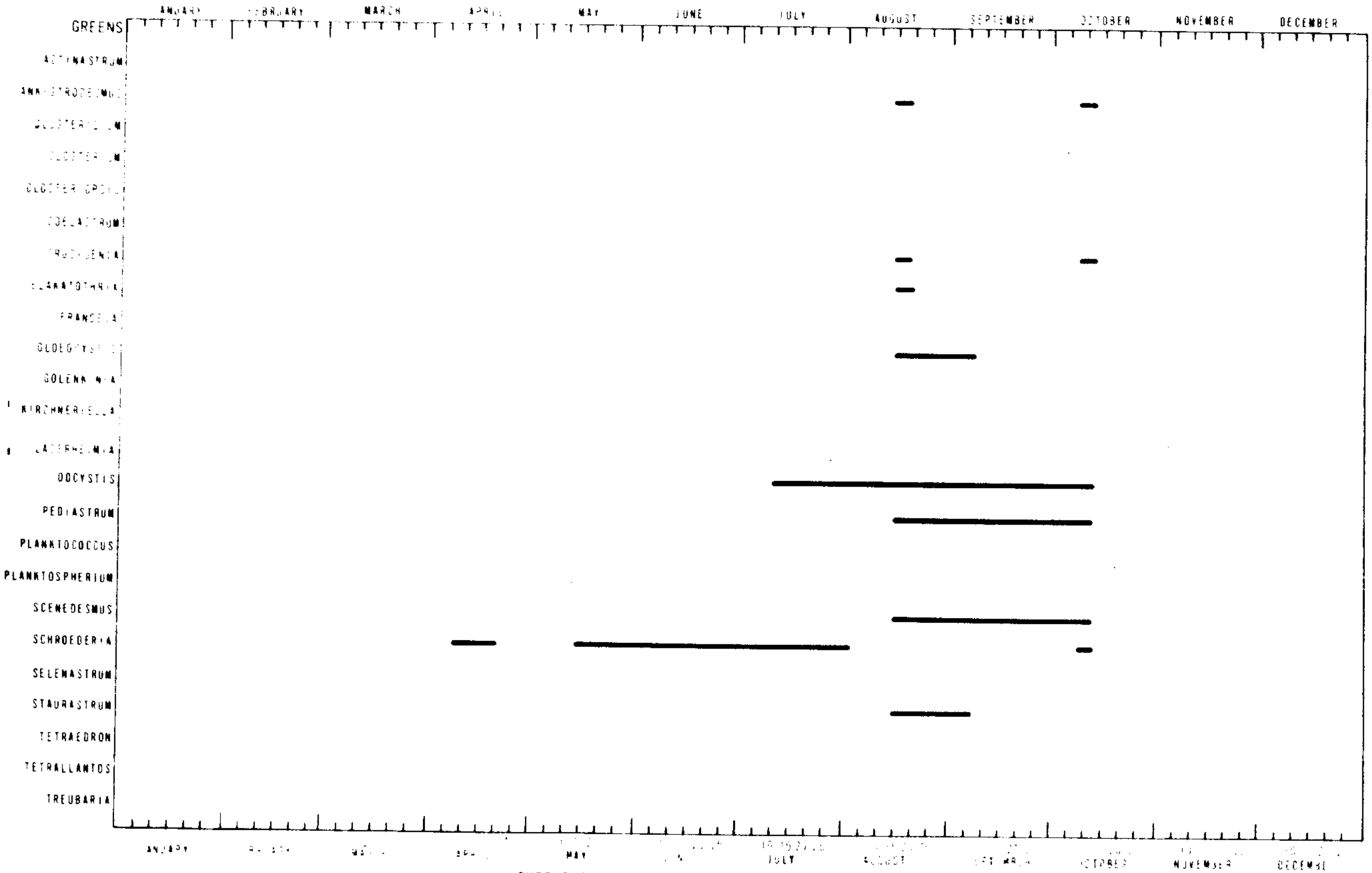
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE LOWER ARM STATION 3
1973



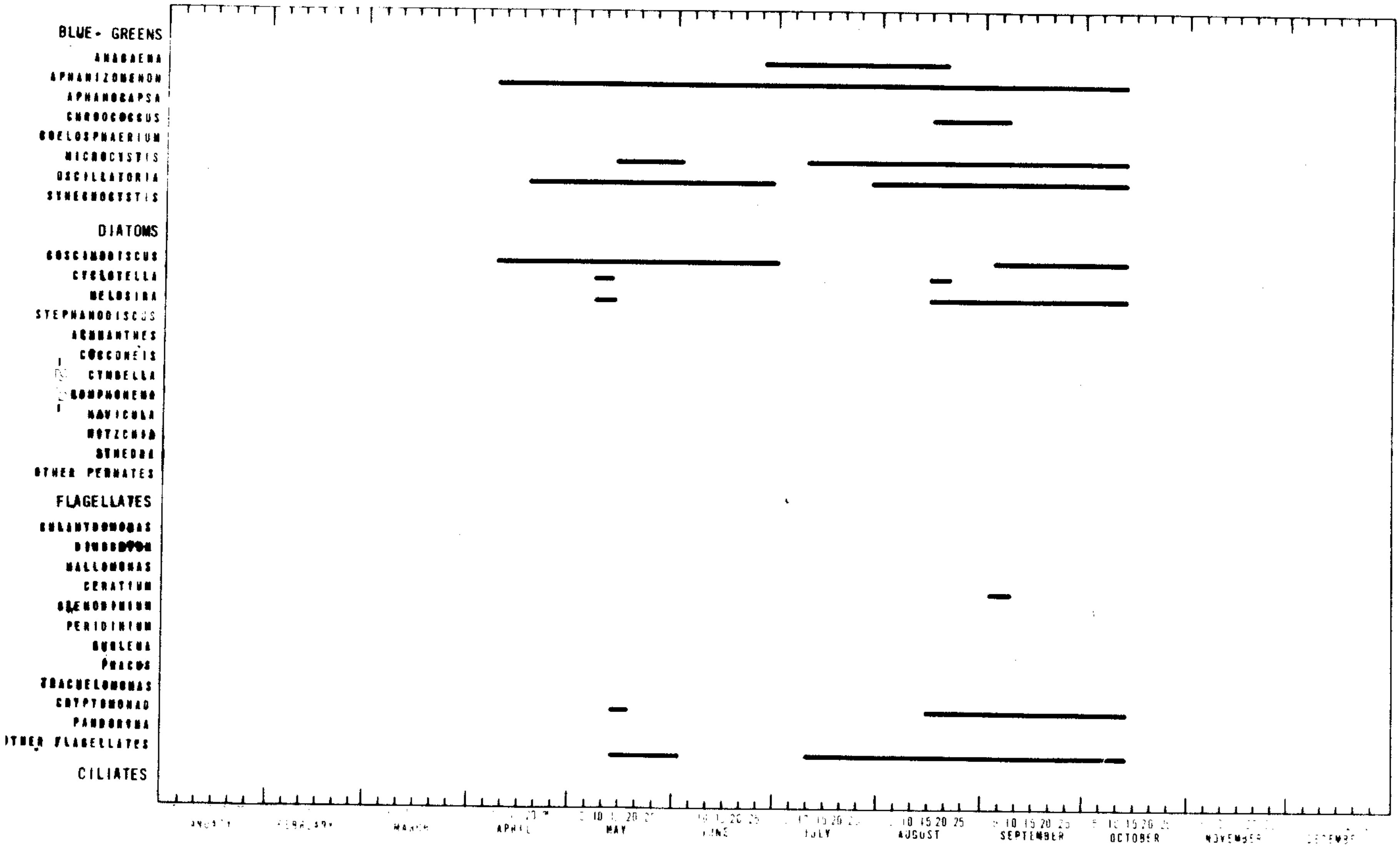
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE LOWER ARM STATION 3
1973

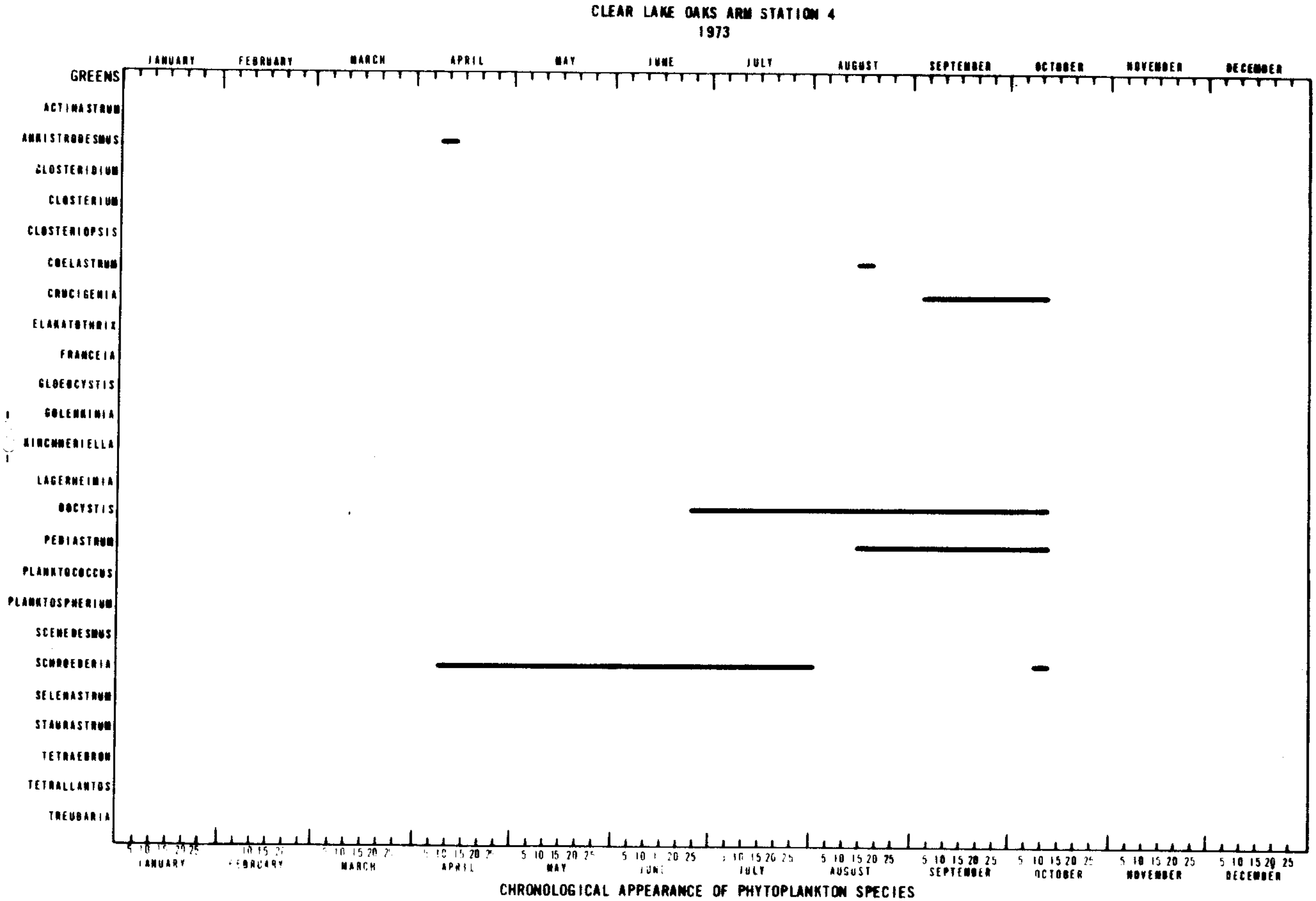


CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

CLEAR LAKE OAKS ARM STATION 4
1973



CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

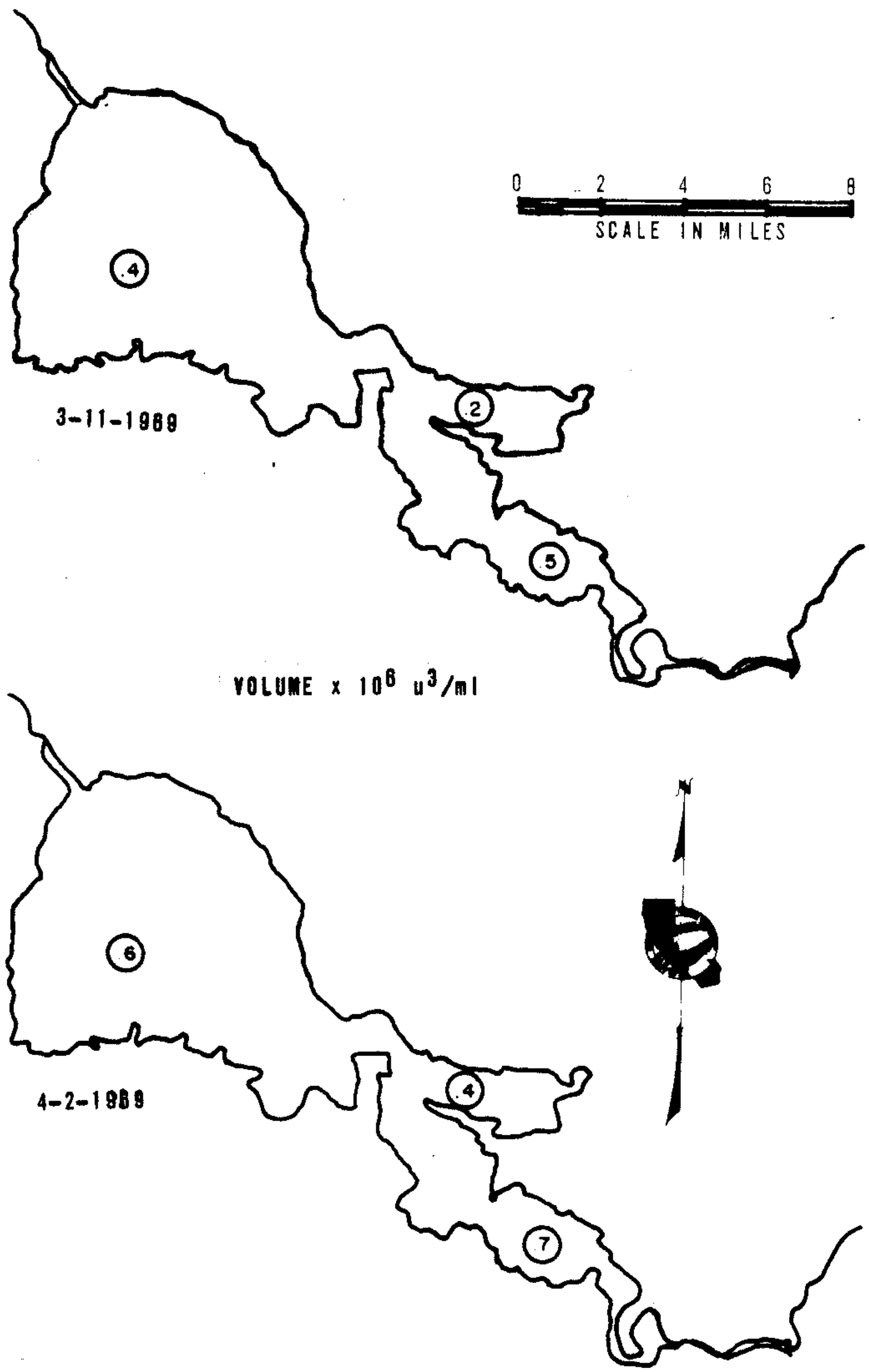

CLEAR LAKE OAKS ARM STATION 4
1973
GREENS
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
ACTINASTRUM
ANKISTRODESMUS
CLOSTERIDIUM
CLOSTERIUM
CLOSTERIOPSIS
COELASTRUM
CRUCIGENIA
ELAKATOTHRIX
FRANCEIA
GLOEOCYSTIS
GOLENKINIA
KIRCHNERIELLA
LAGERHEIMIA
OOCYSTIS
PEDIASTRUM
PLANKTOCOCCUS
PLANKTOSPHERIUM
SCENEDESMUS
SCHROEDERIA
SELENASTRUM
STAURASTRUM
TETRAEDRON
TETRALLANTOS
TREUBARIA
CHRONOLOGICAL APPEARANCE OF PHYTOPLANKTON SPECIES

APPENDIX D

SYNOPTIC AVERAGE WATER COLUMN PHYTOPLANKTON VOLUMES
1968-1973

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

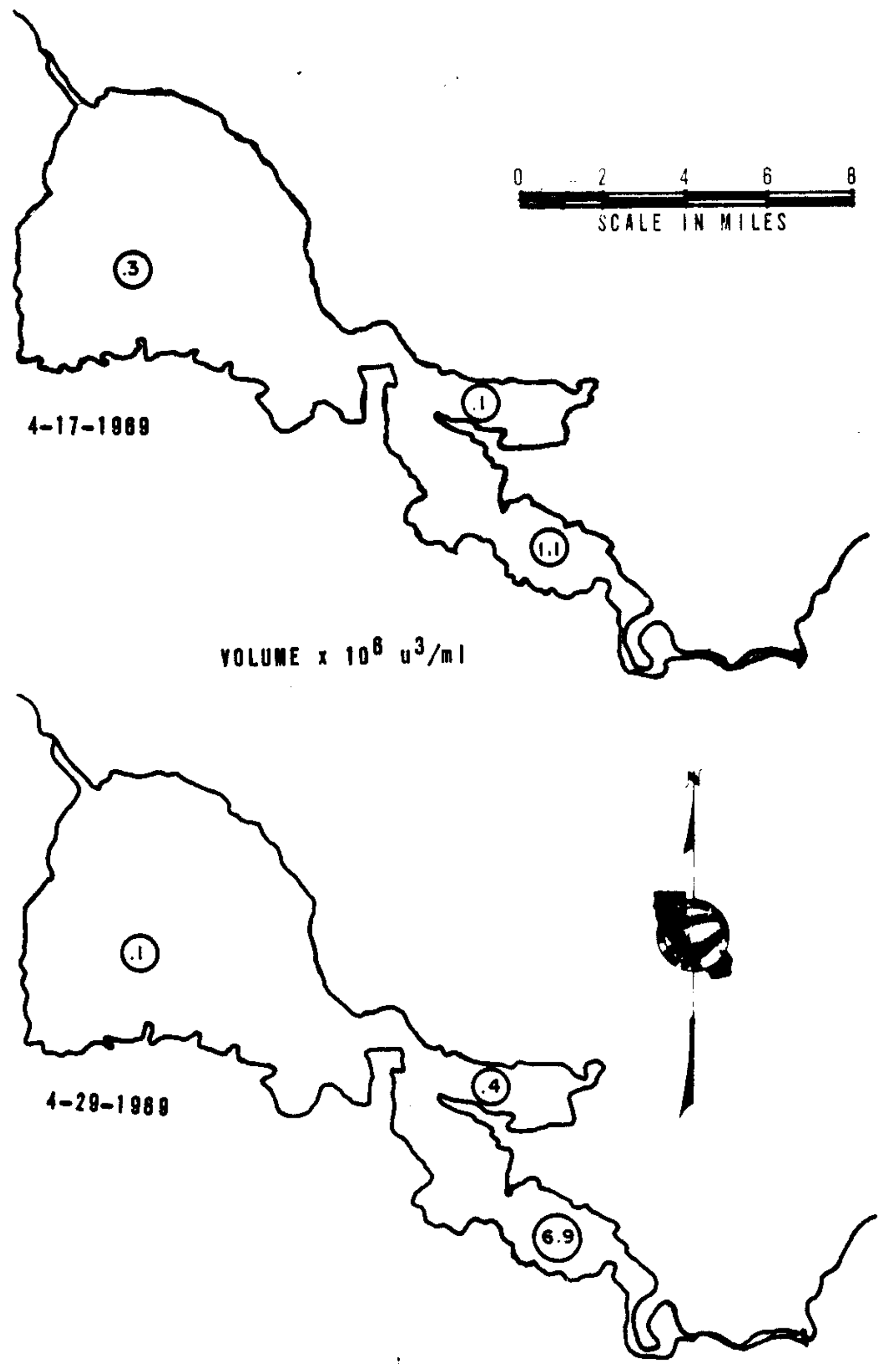
CLEAR LAKE



AVERAGE WATER COLUMN PHYTOPLANKTON VOLUMES

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

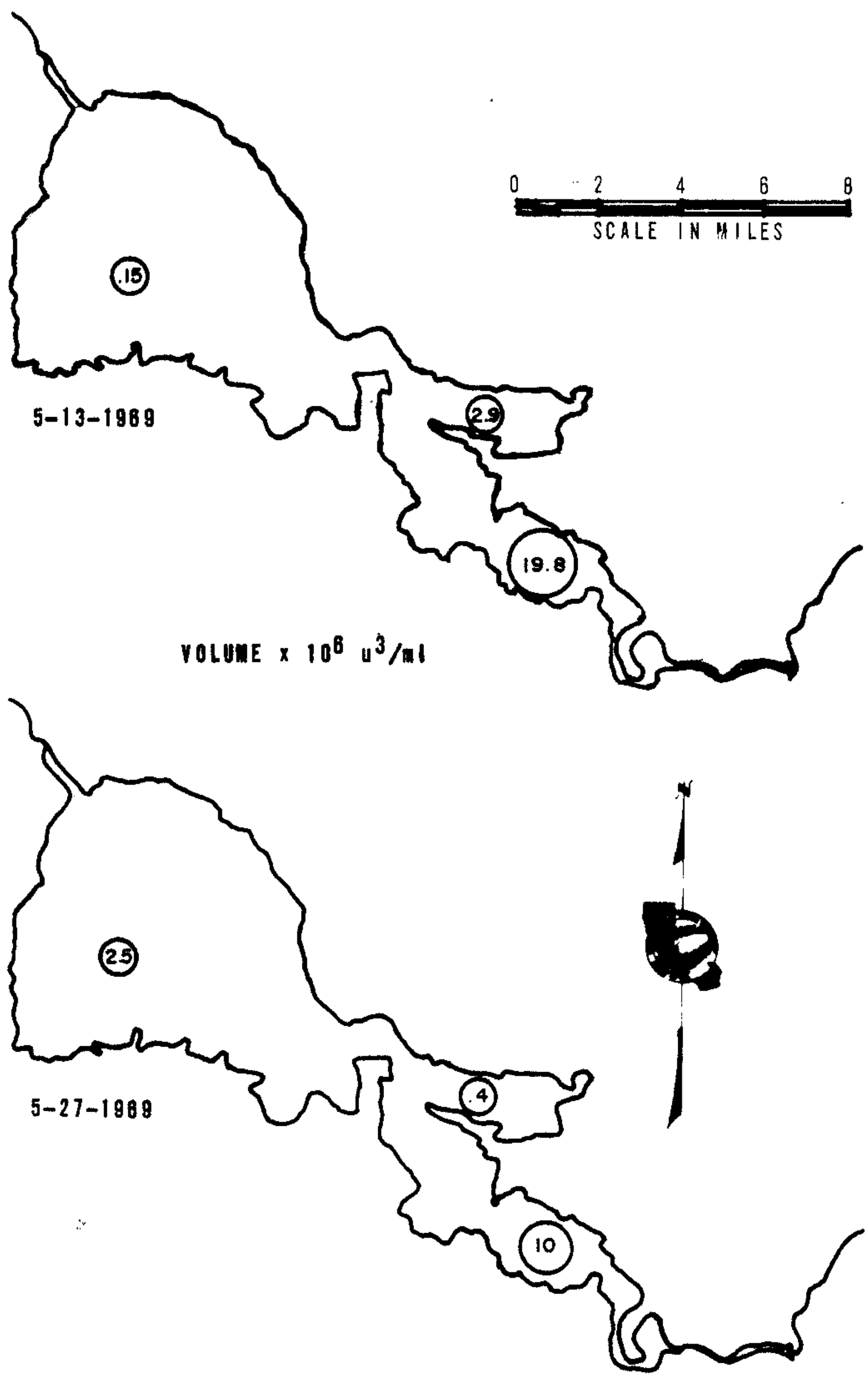
CLEAR LAKE



AVERAGE WATER COLUMN PHYTOPLANKTON VOLUMES

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

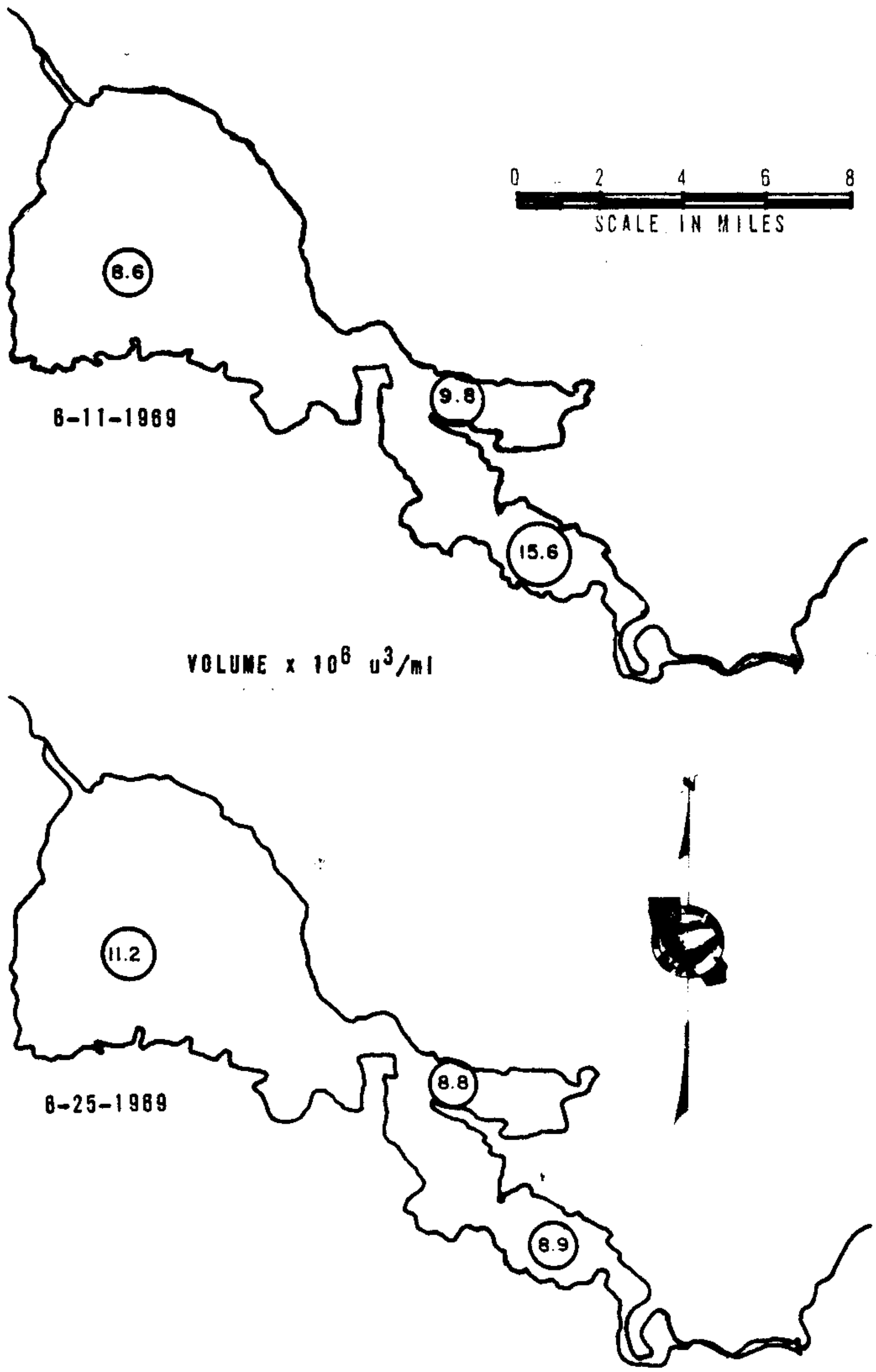
CLEAR LAKE



AVERAGE WATER COLUMN PHYTOPLANKTON VOLUMES

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

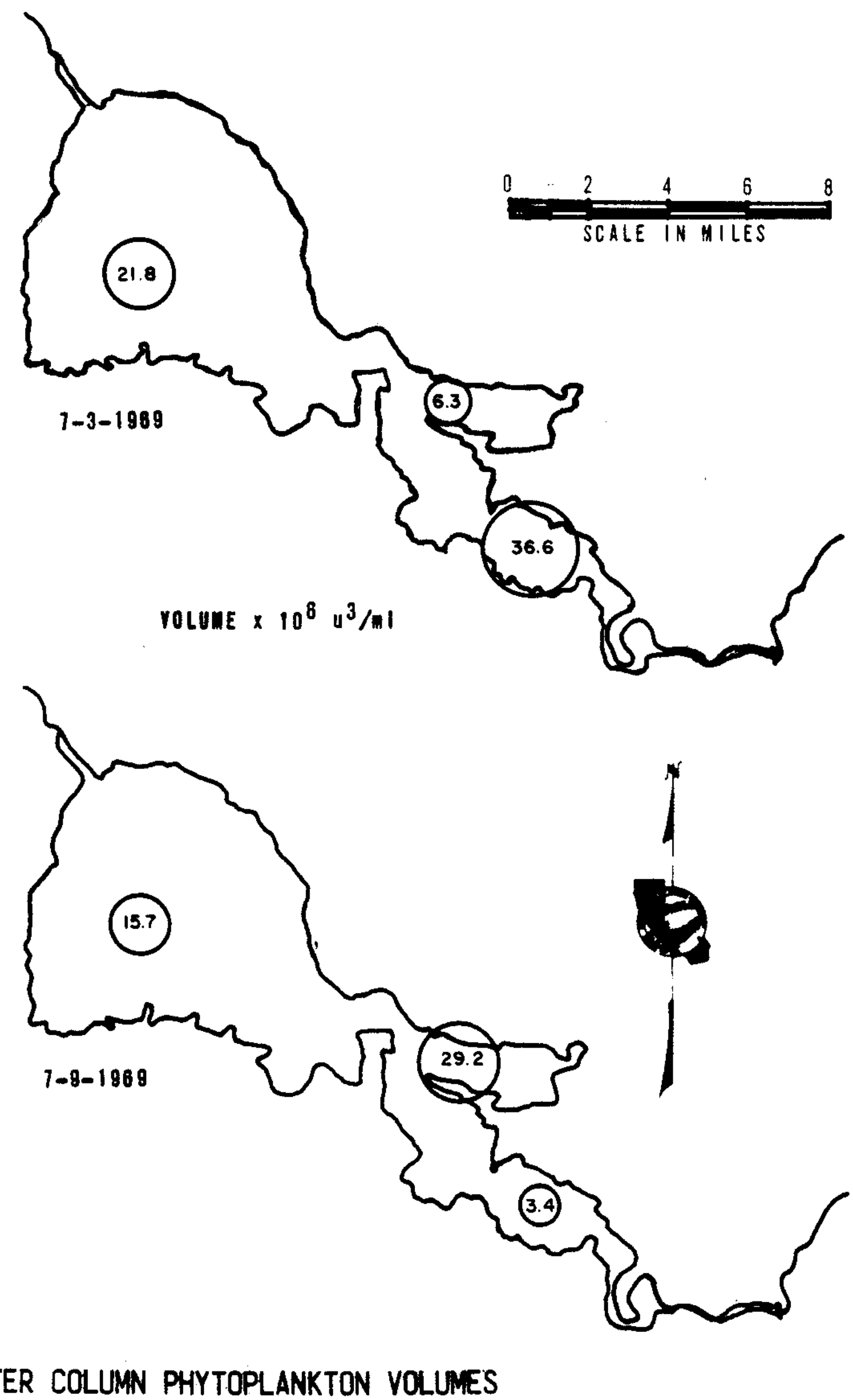
CLEAR LAKE



AVERAGE WATER COLUMN PHYTOPLANKTON VOLUMES

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

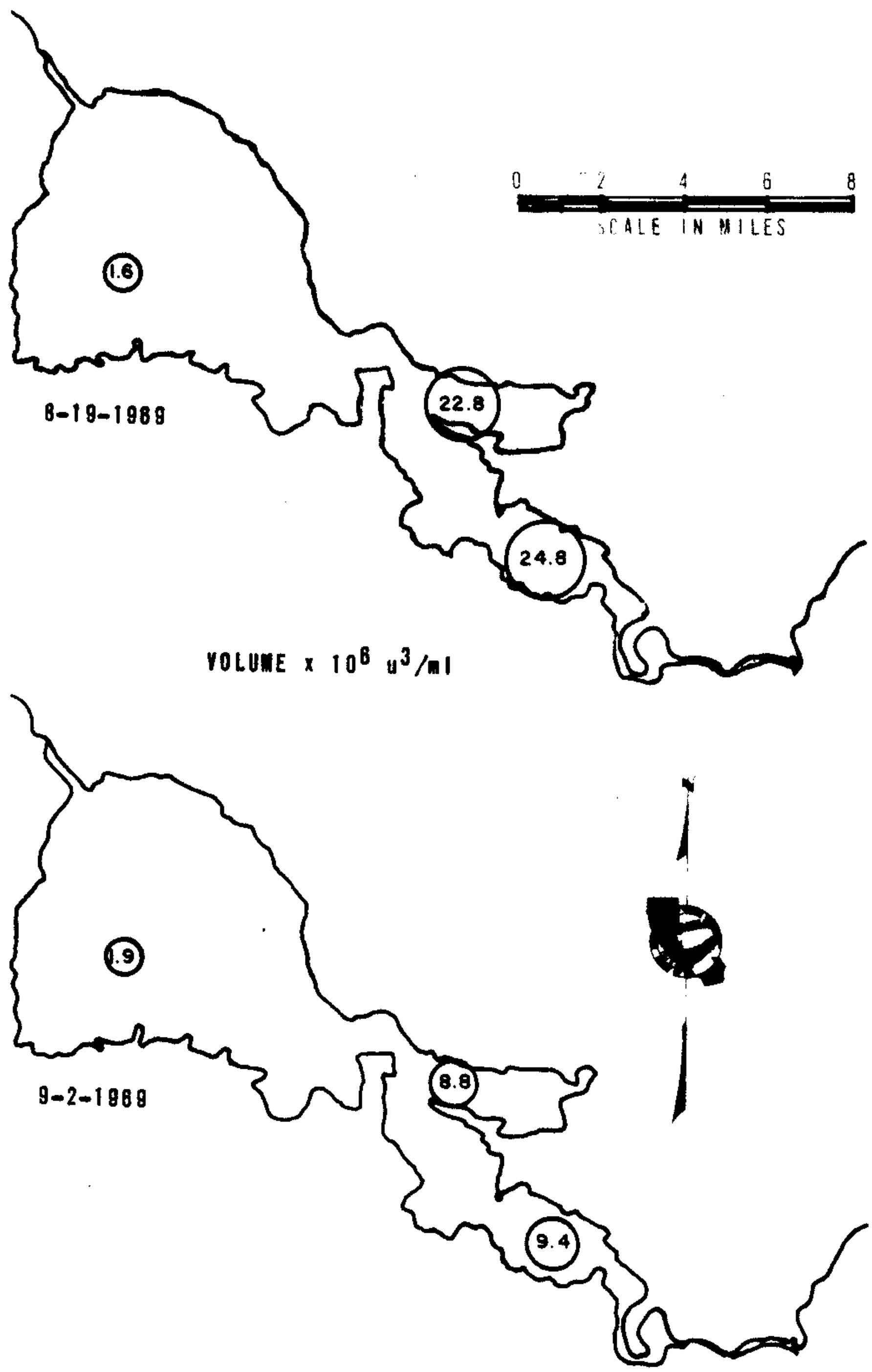
CLEAR LAKE



AVERAGE WATER COLUMN PHYTOPLANKTON VOLUMES

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

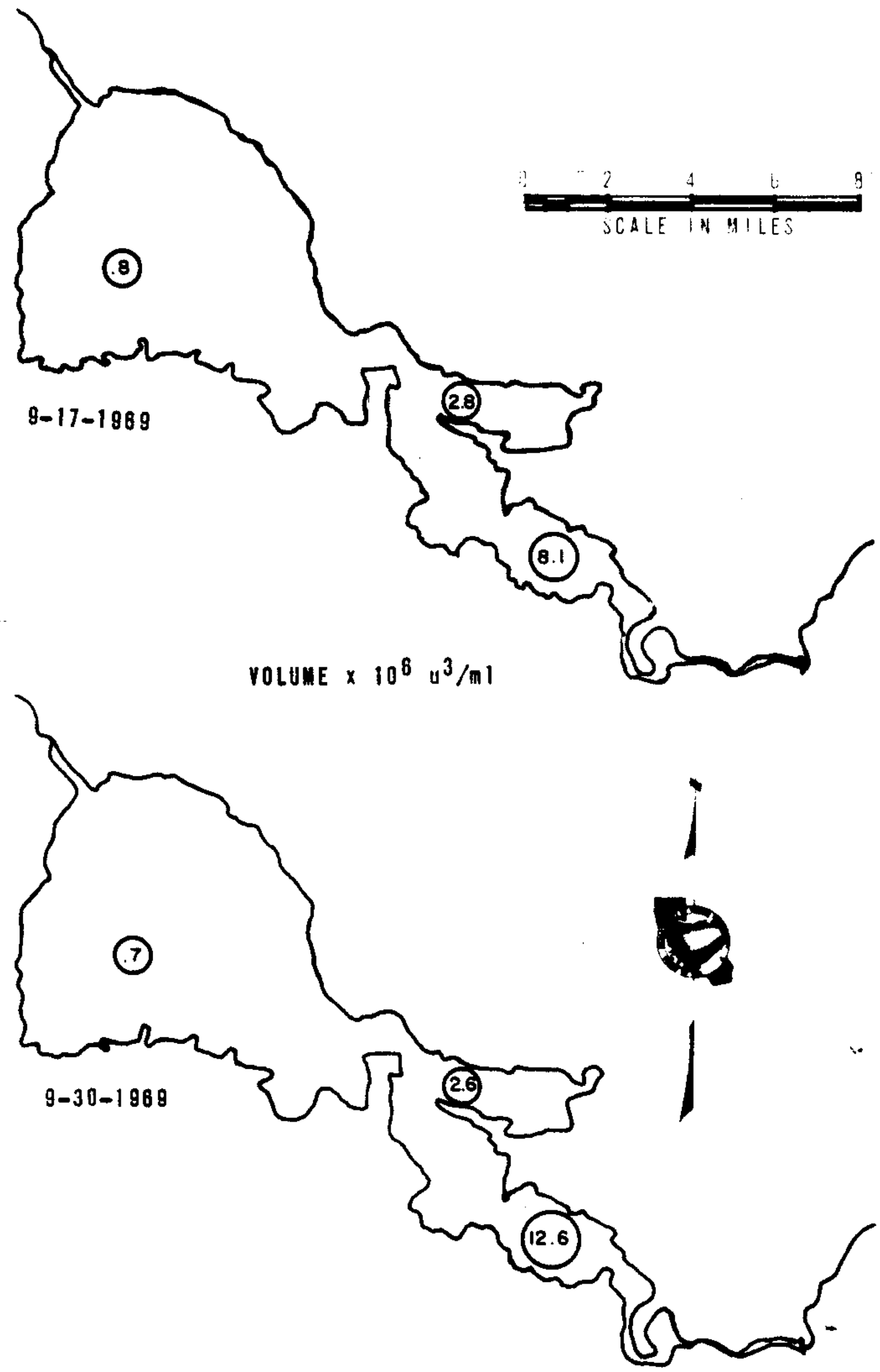
CLEAR LAKE



AVERAGE WATER COLUMN PHYTOPLANKTON VOLUMES

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

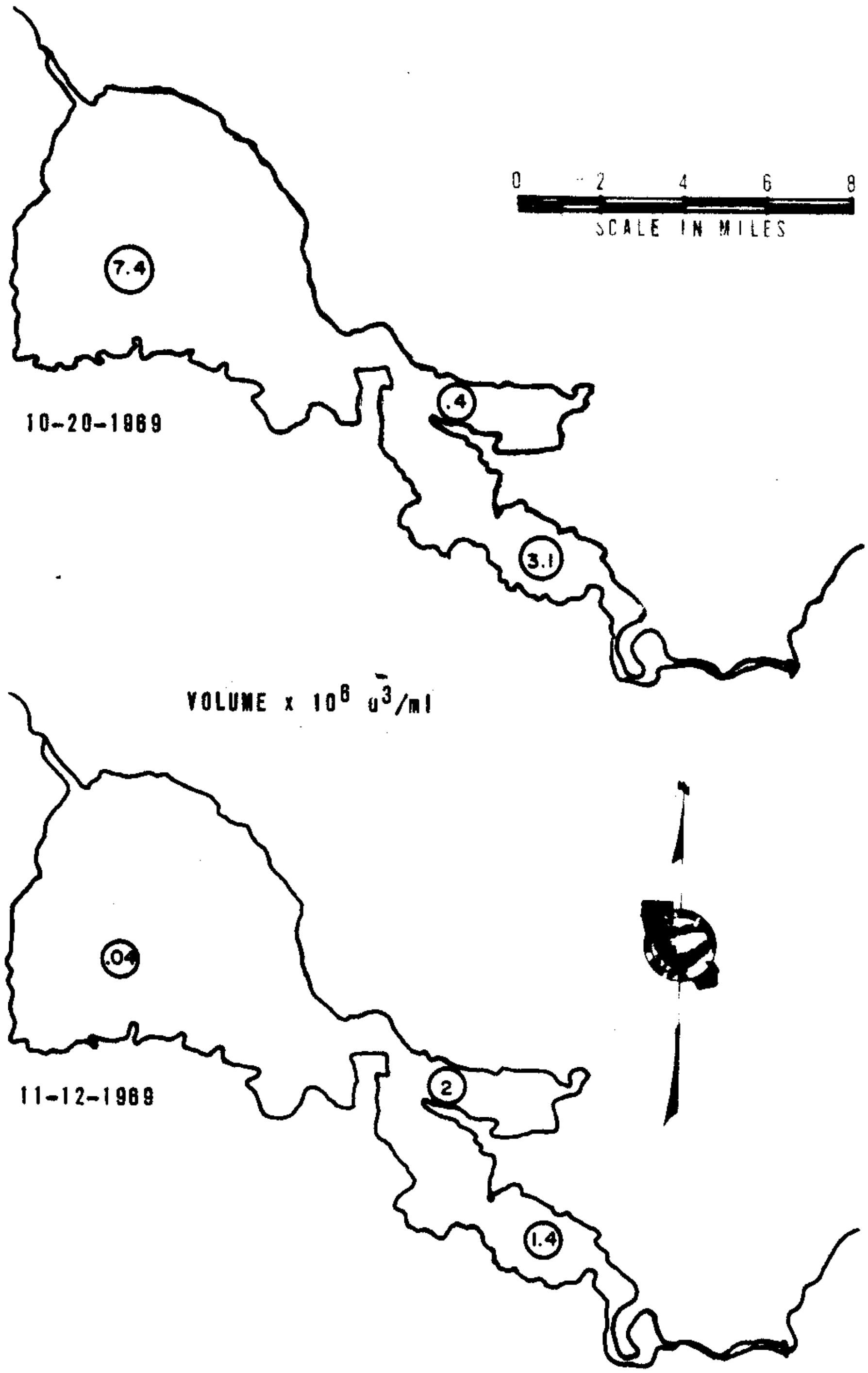
CLEAR LAKE



AVERAGE WATER COLUMN PHYTOPLANKTON VOLUMES

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

CLEAR LAKE



AVERAGE WATER COLUMN PHYTOPLANKTON VOLUMES

STATE OF CALIFORNIA
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NORTHERN DISTRICT

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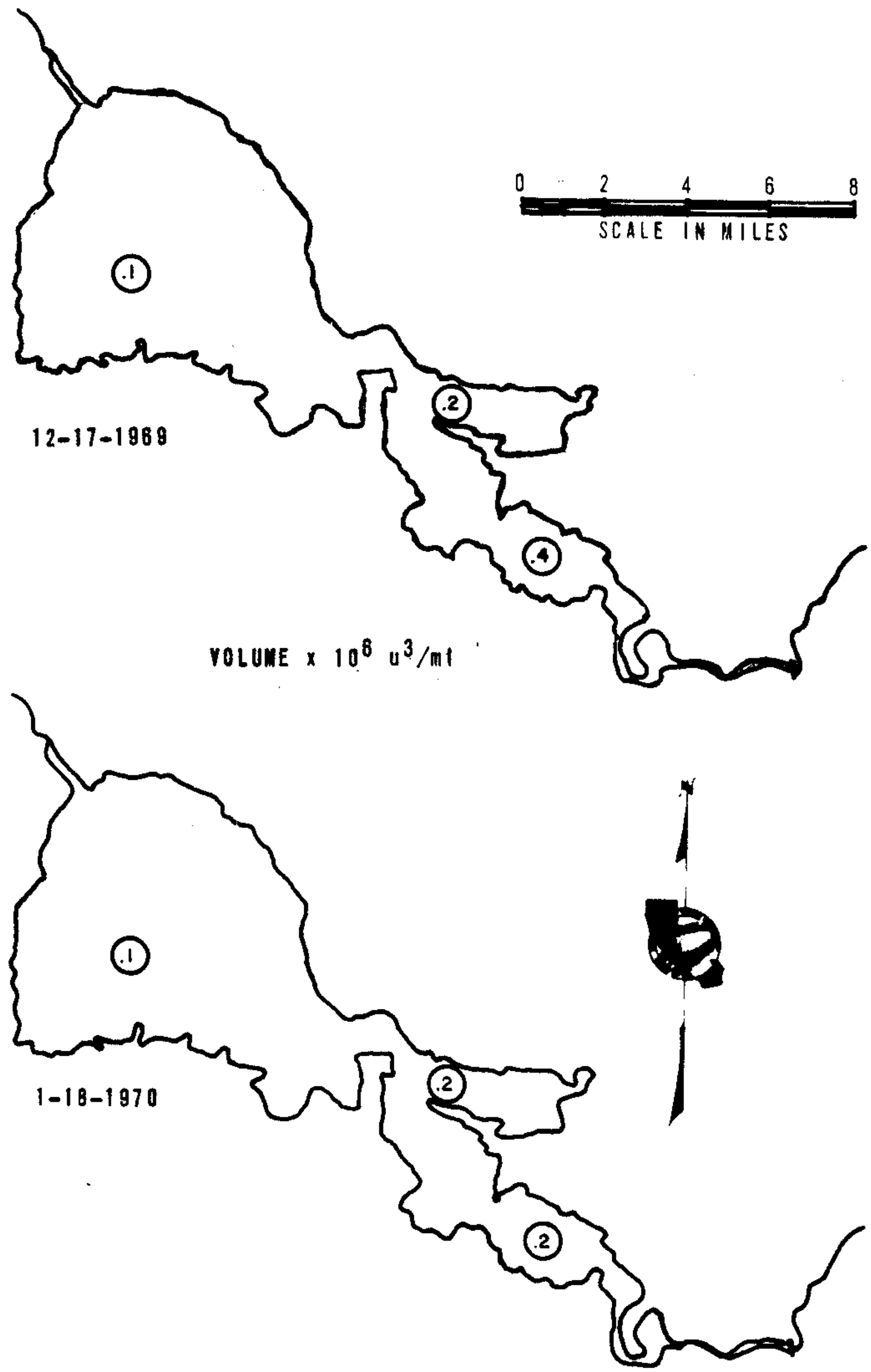

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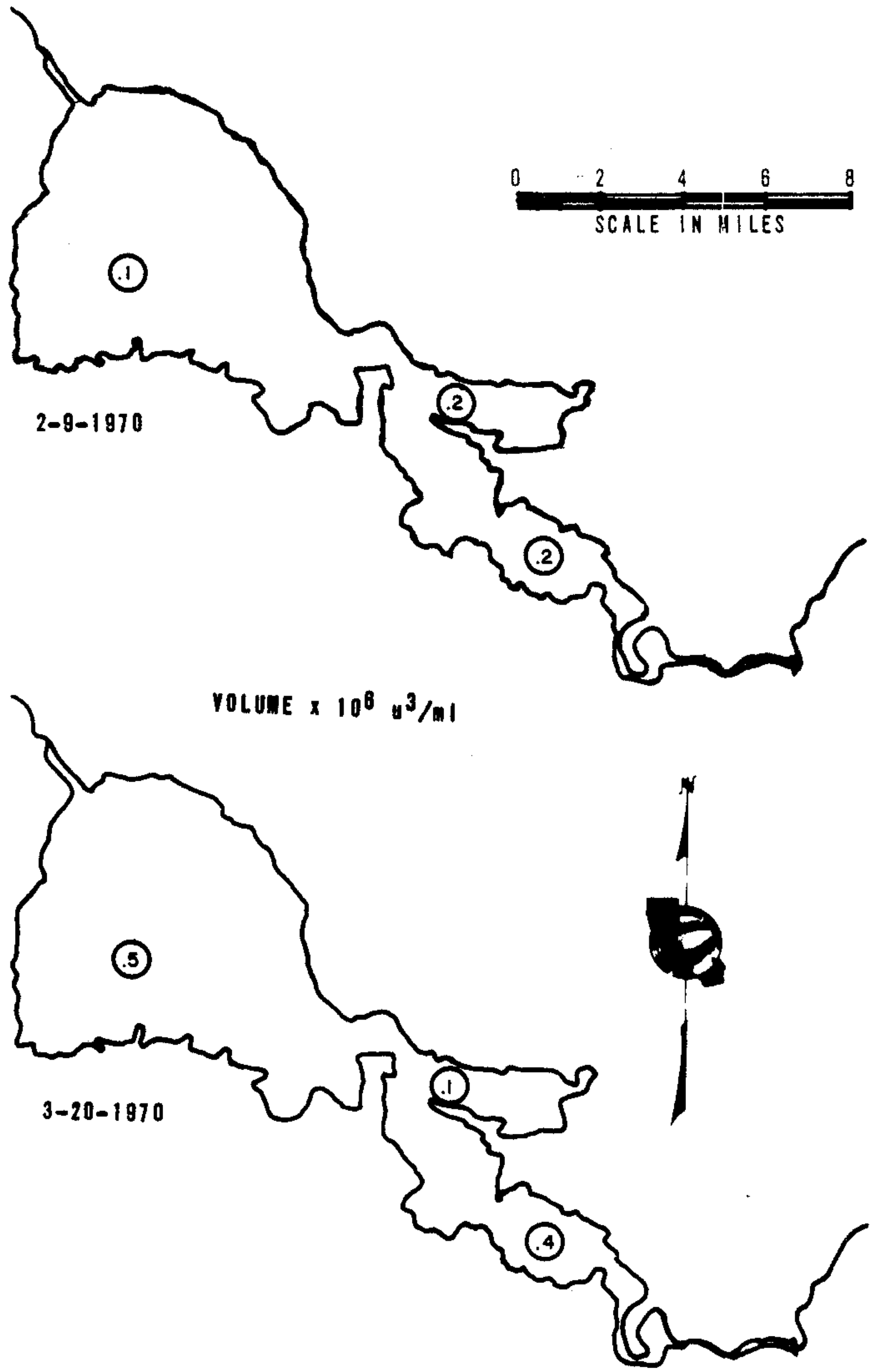

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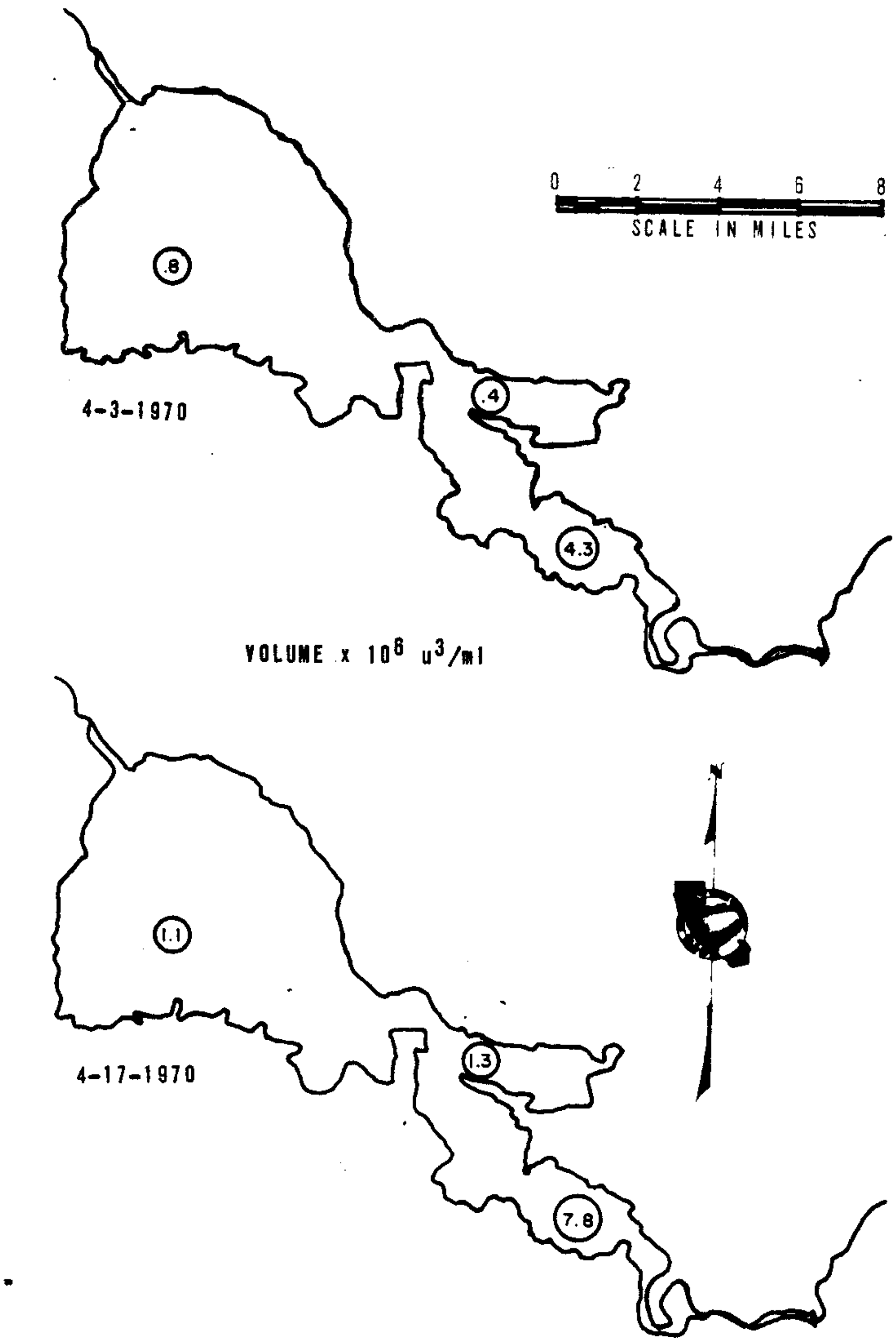

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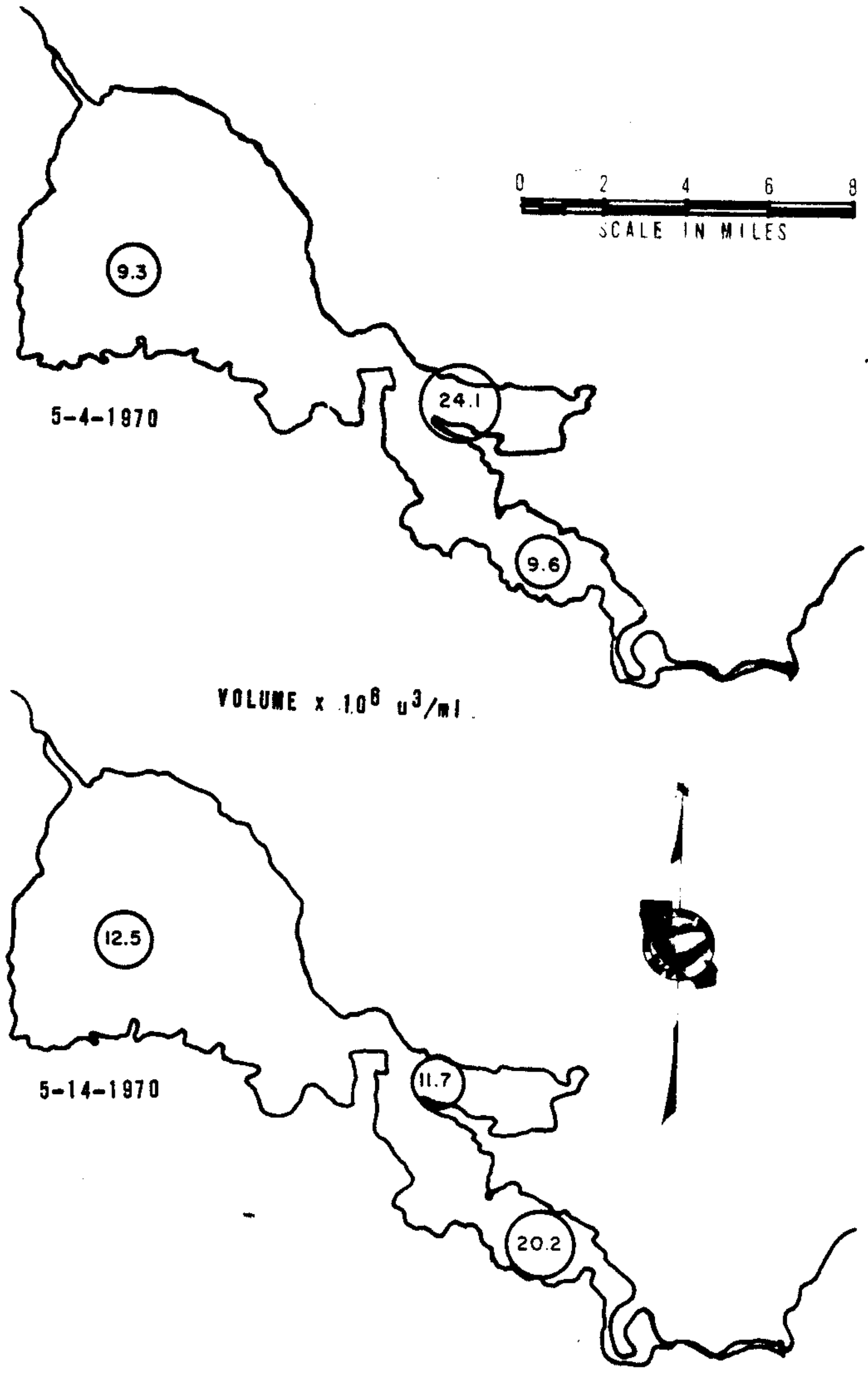

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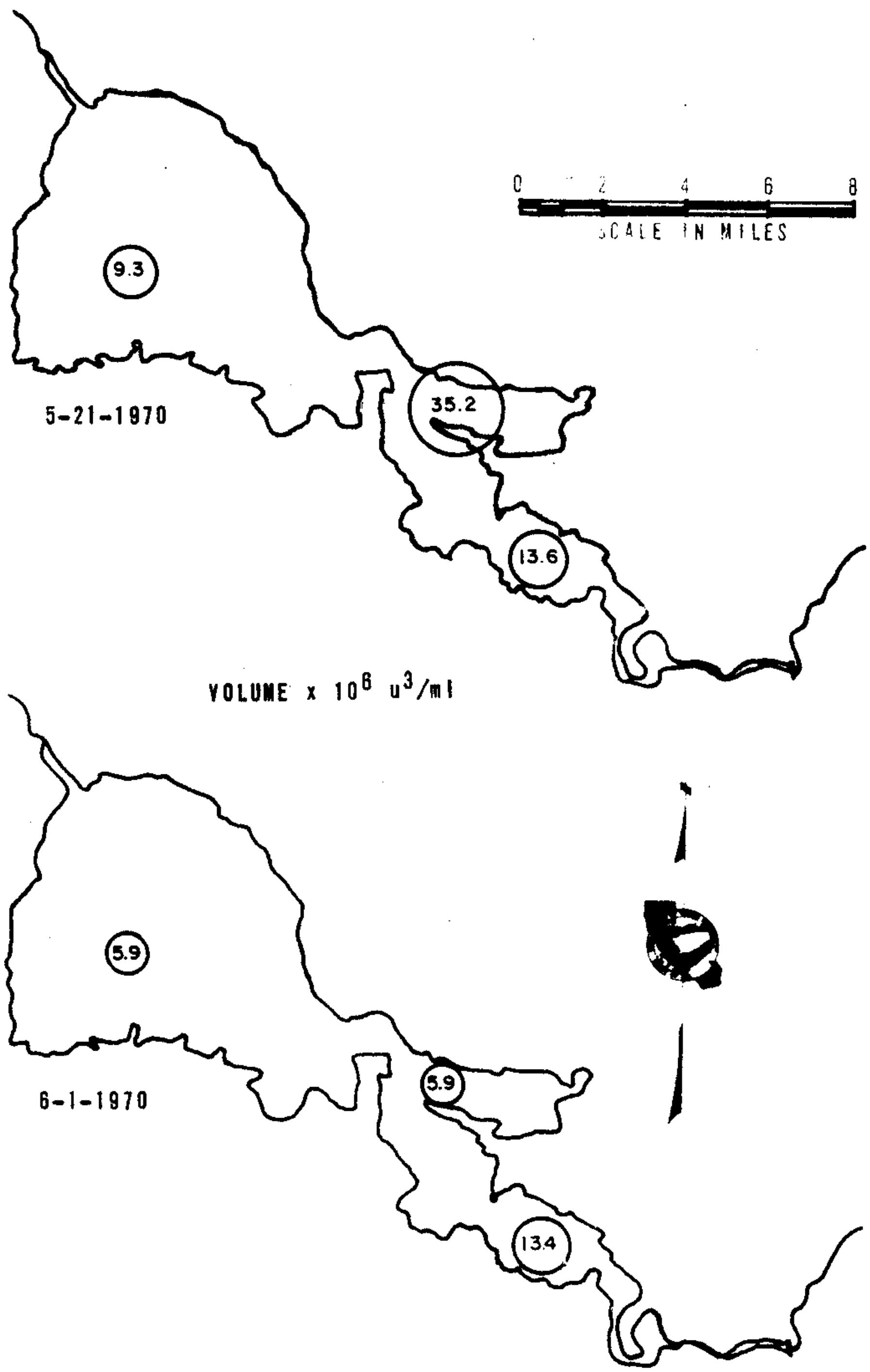

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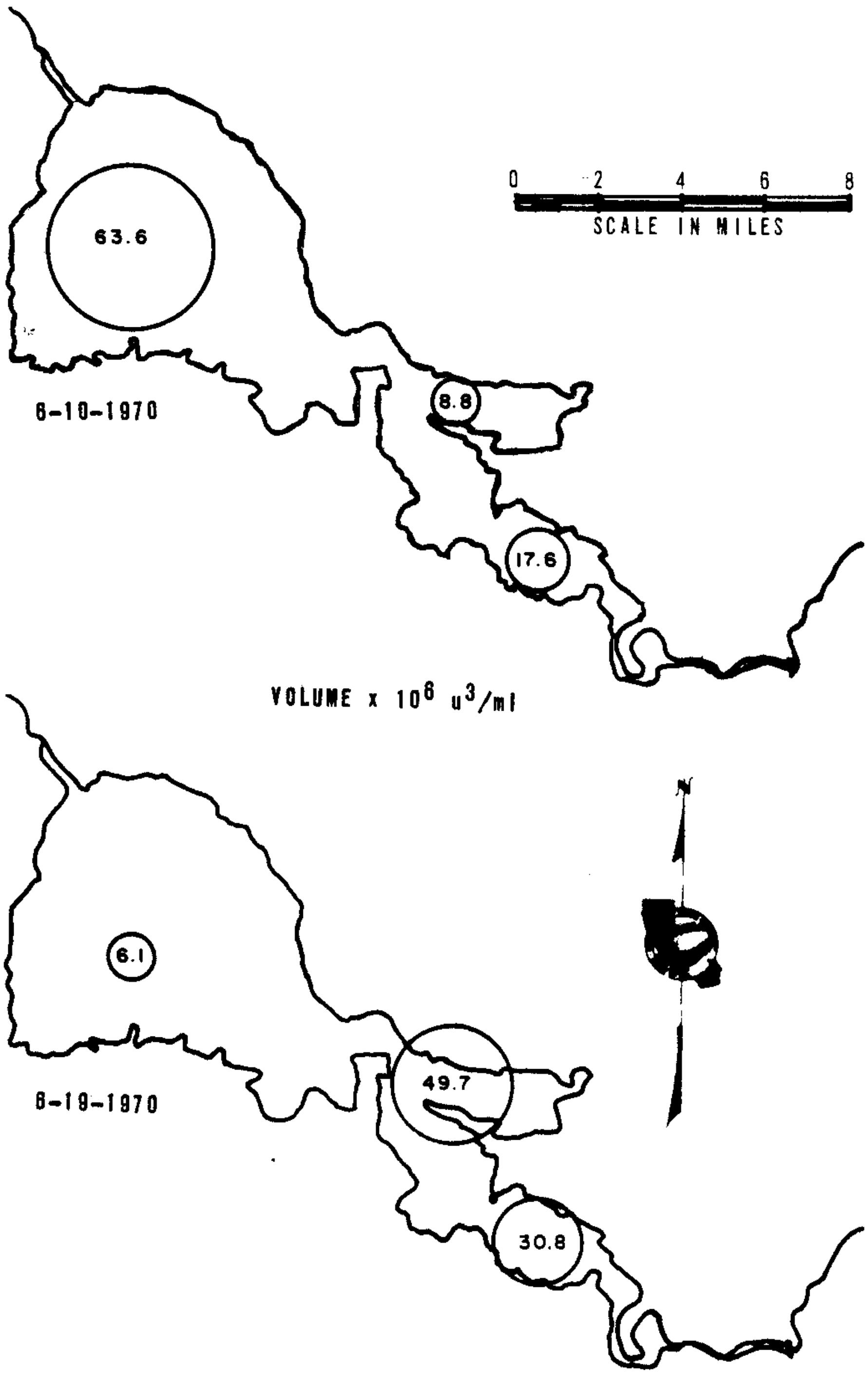

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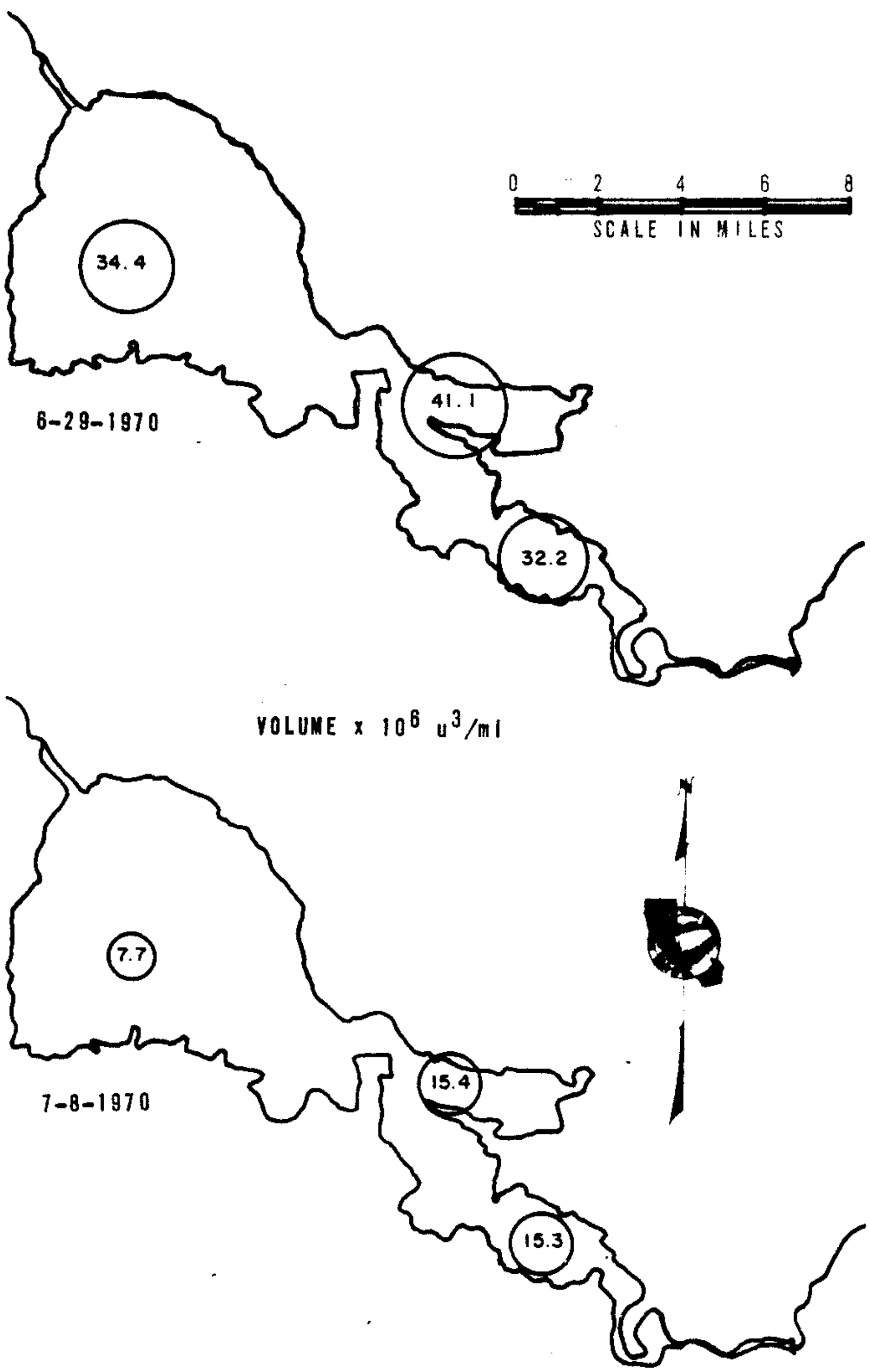

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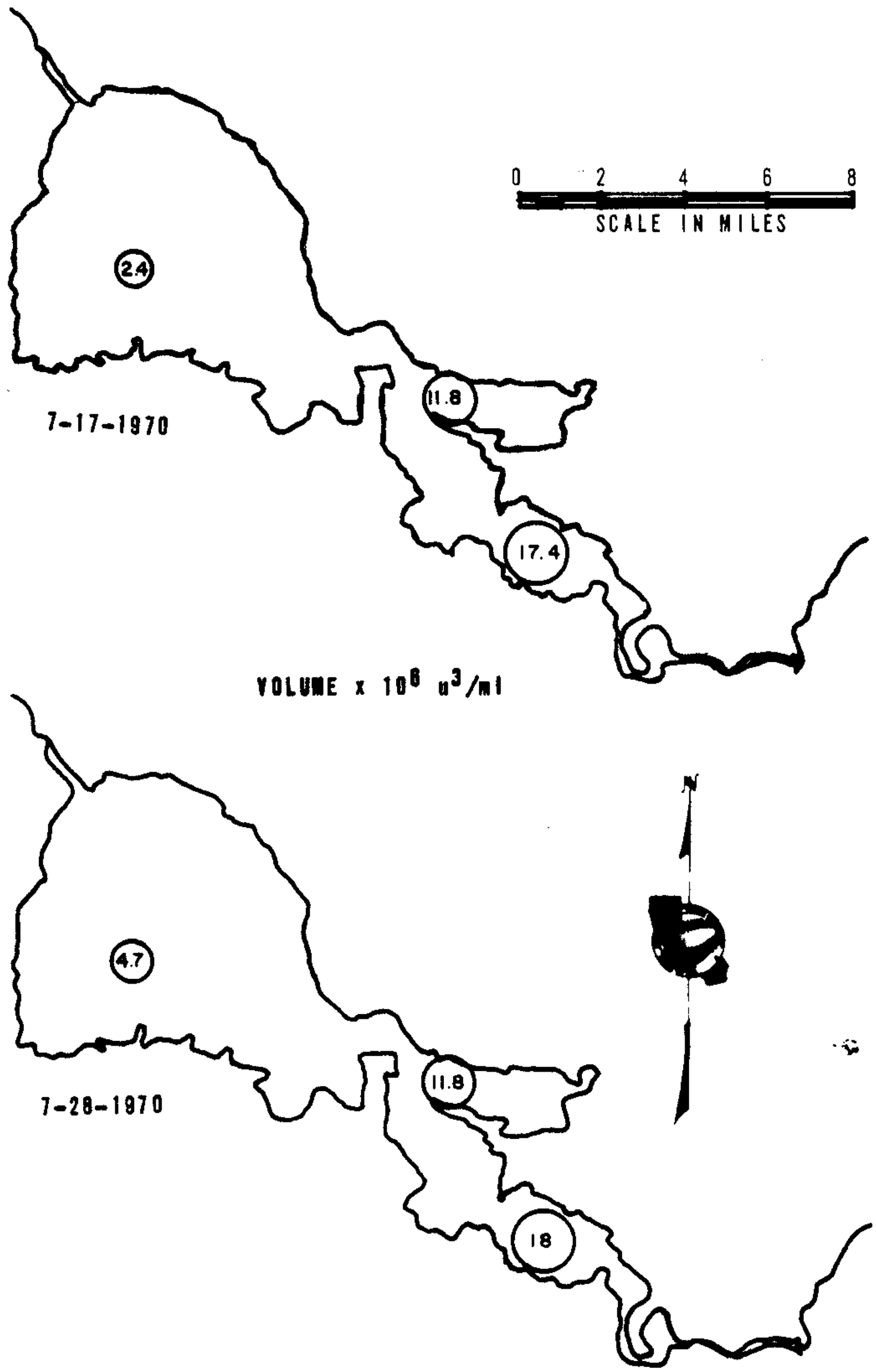

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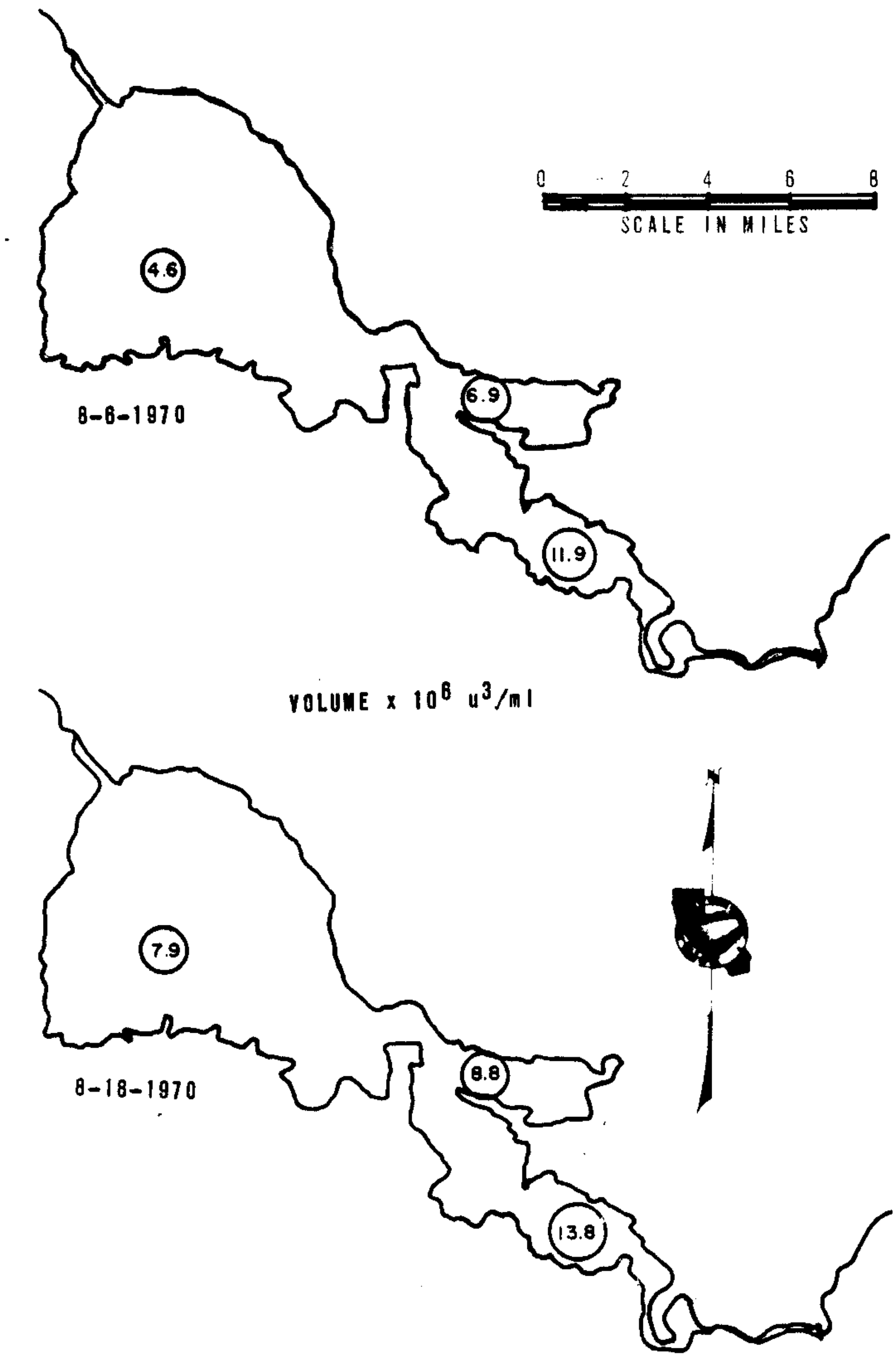

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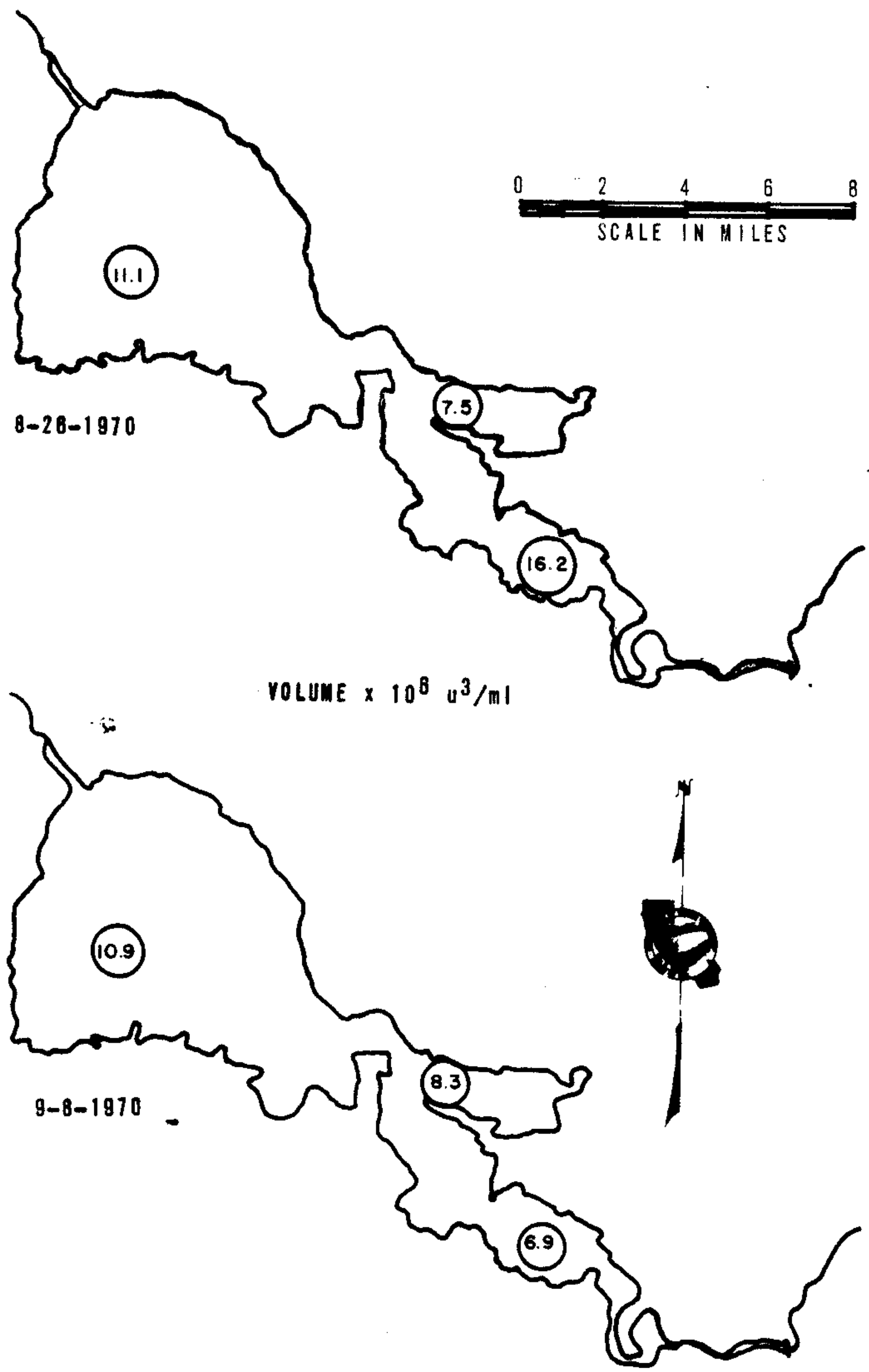

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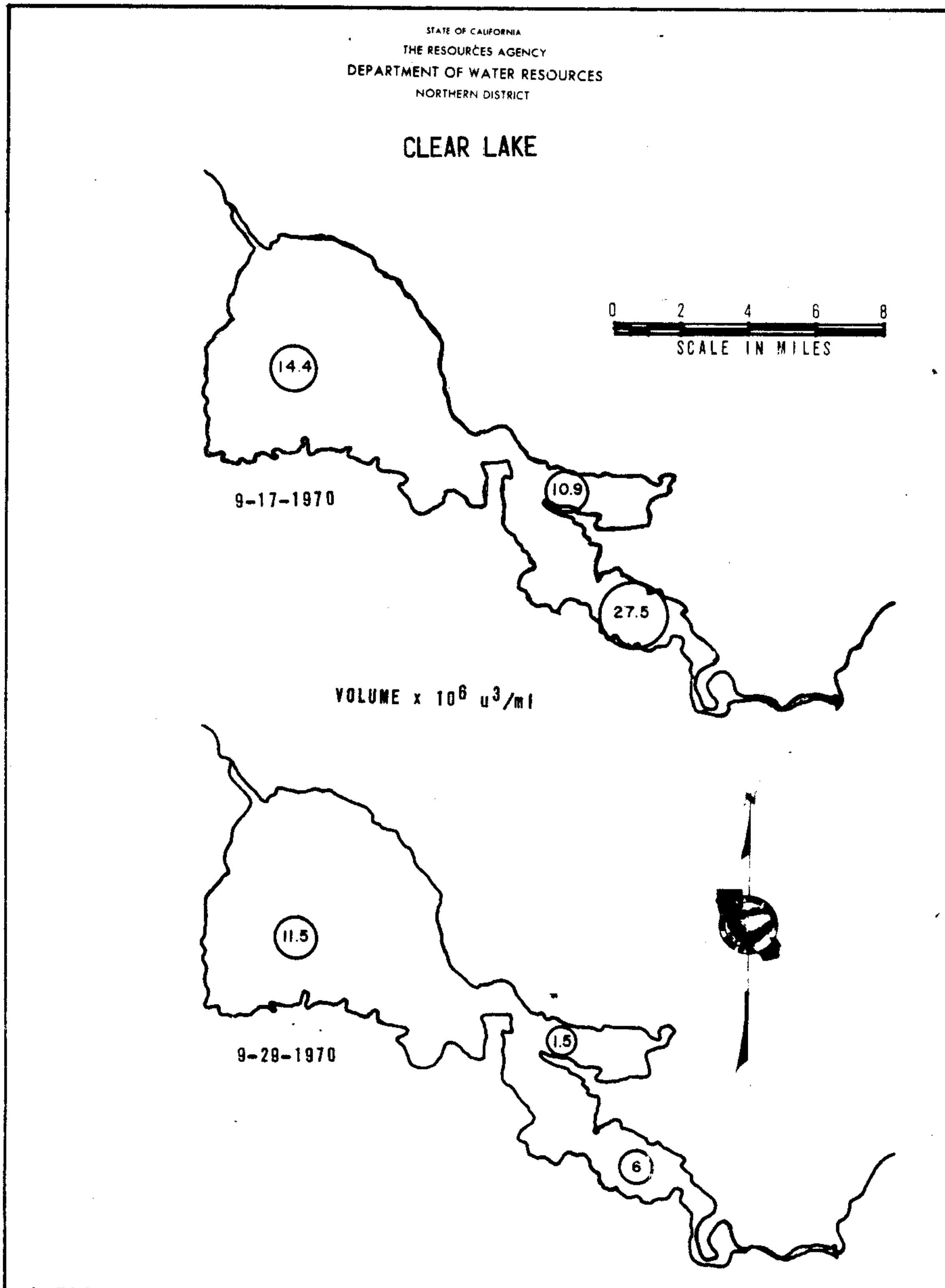

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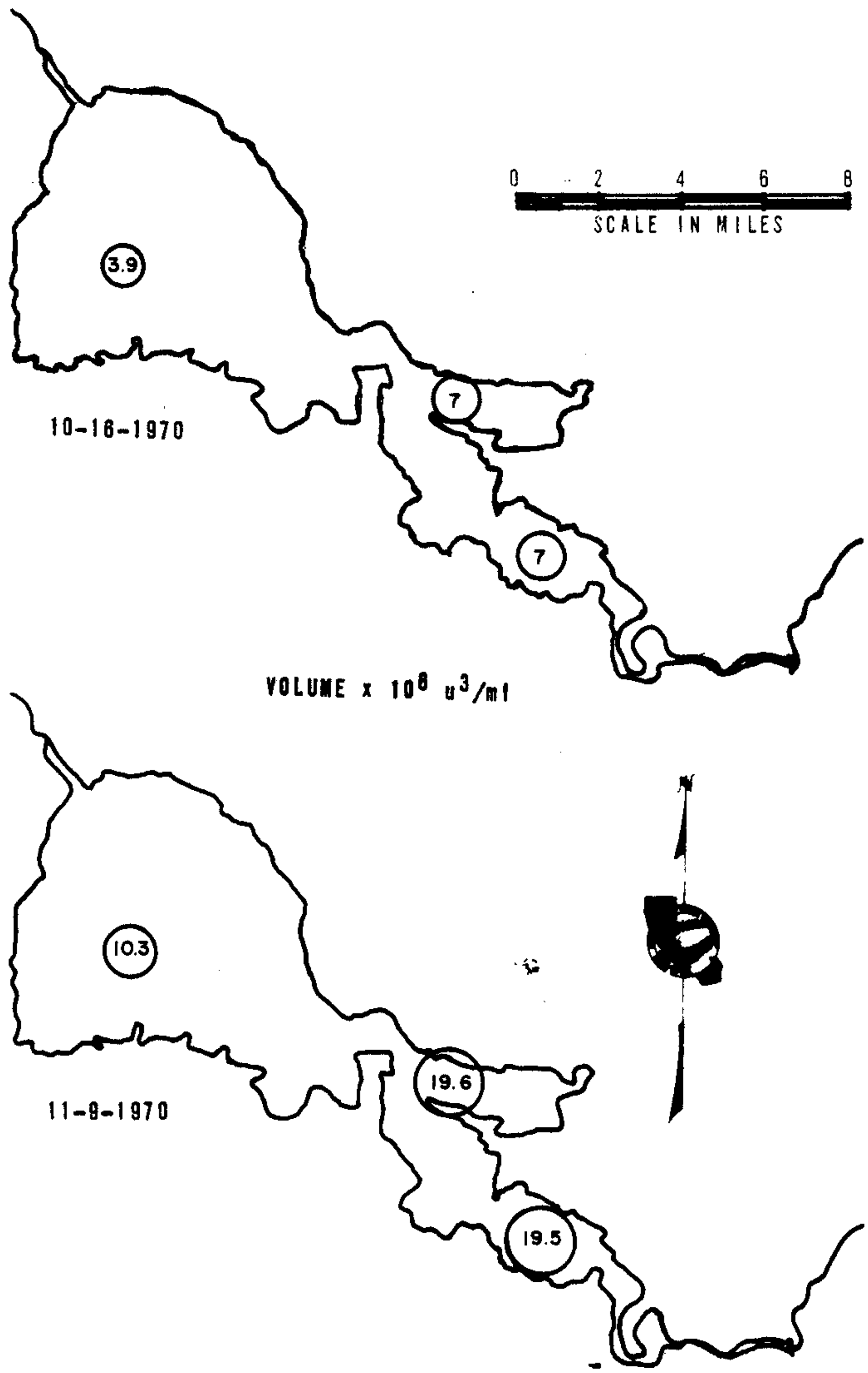

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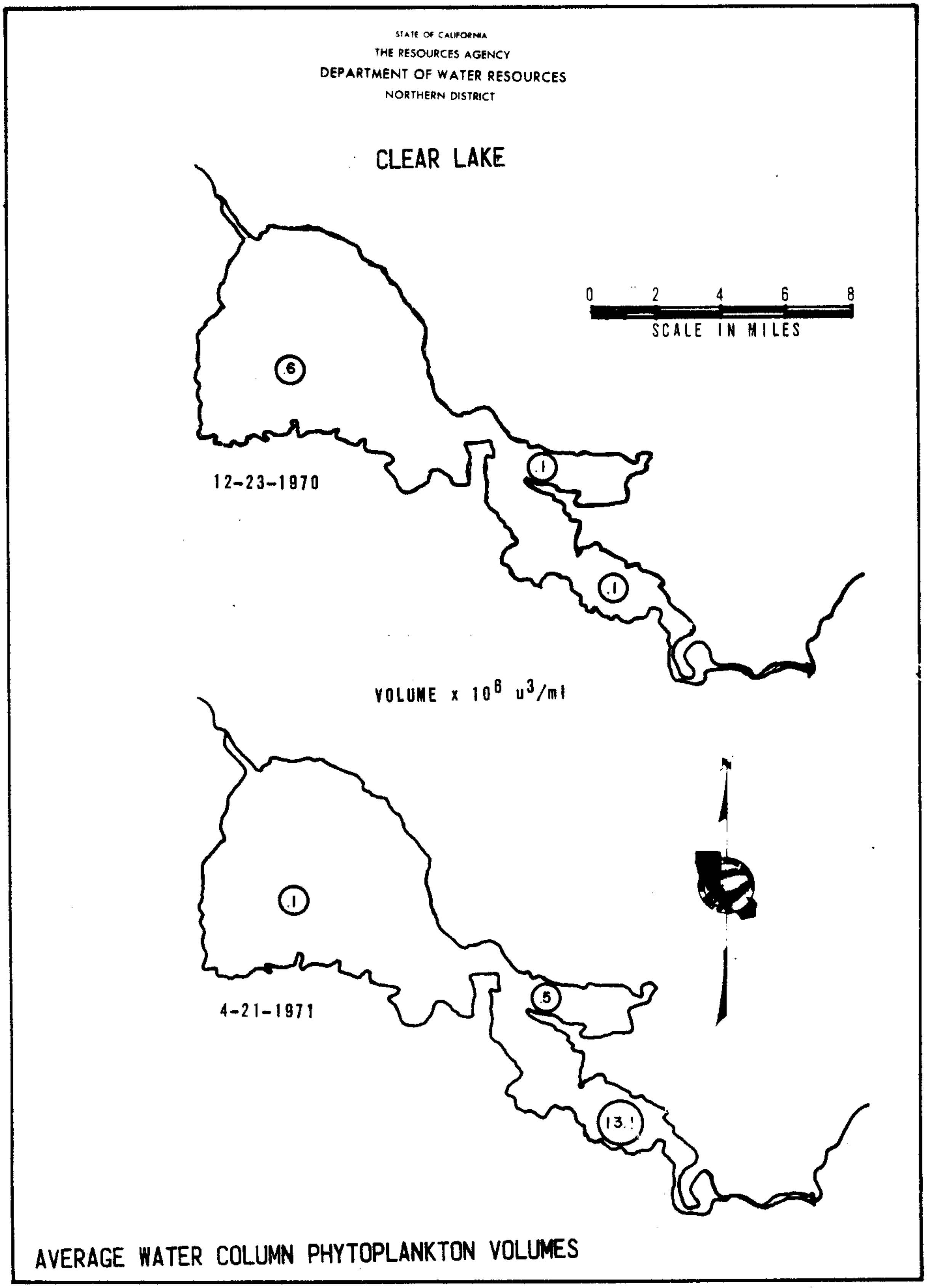
STATE OF CALIFORNIA
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NORTHERN DISTRICT
CLEAR LAKE
0 2 4 6 8
SCALE IN MILES
6
.1
.1
12-23-1970
VOLUME x 10^6 u^3/ml
.1
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4-21-1971
AVERAGE WATER COLUMN PHYTOPLANKTON VOLUMES

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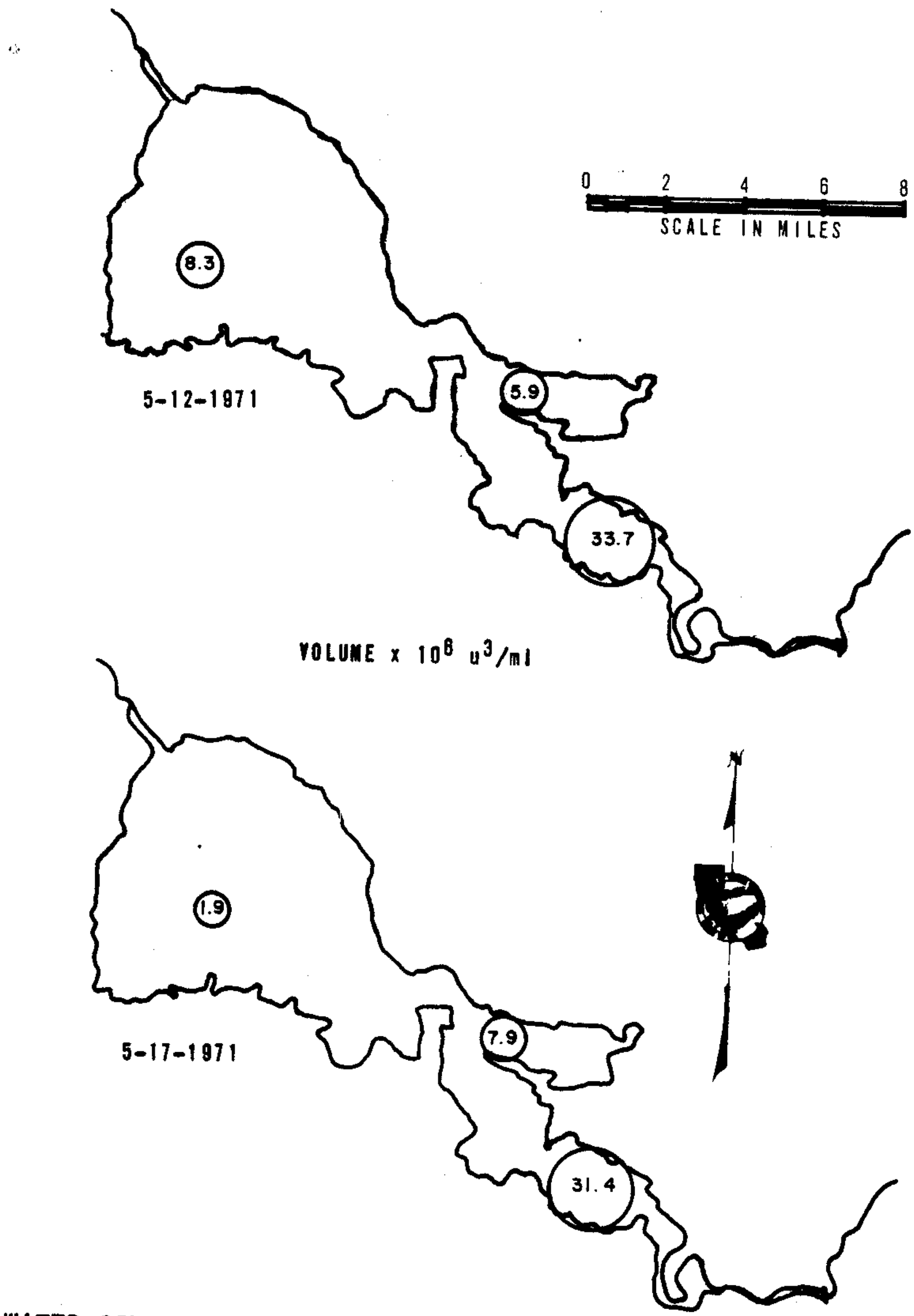

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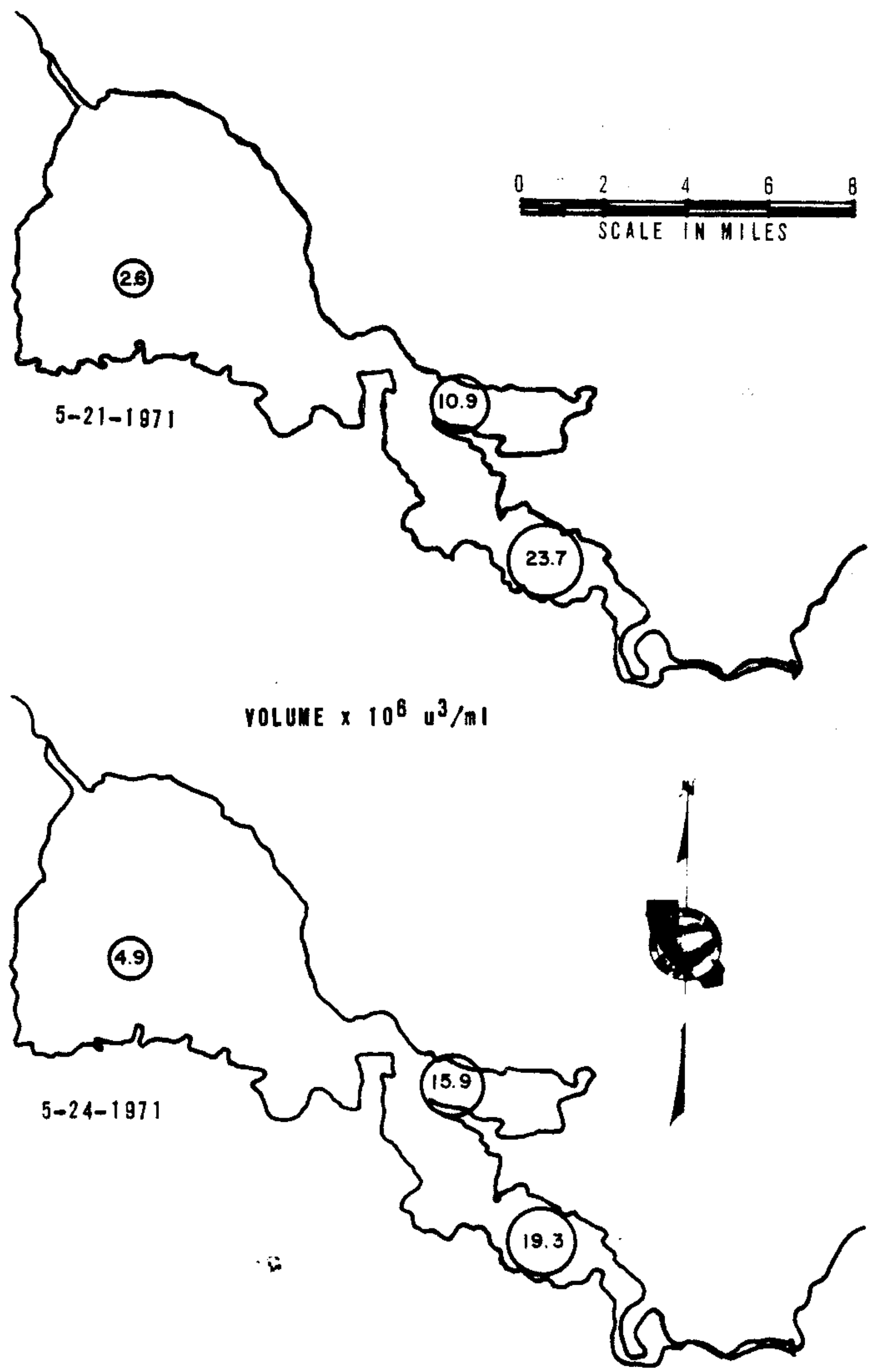

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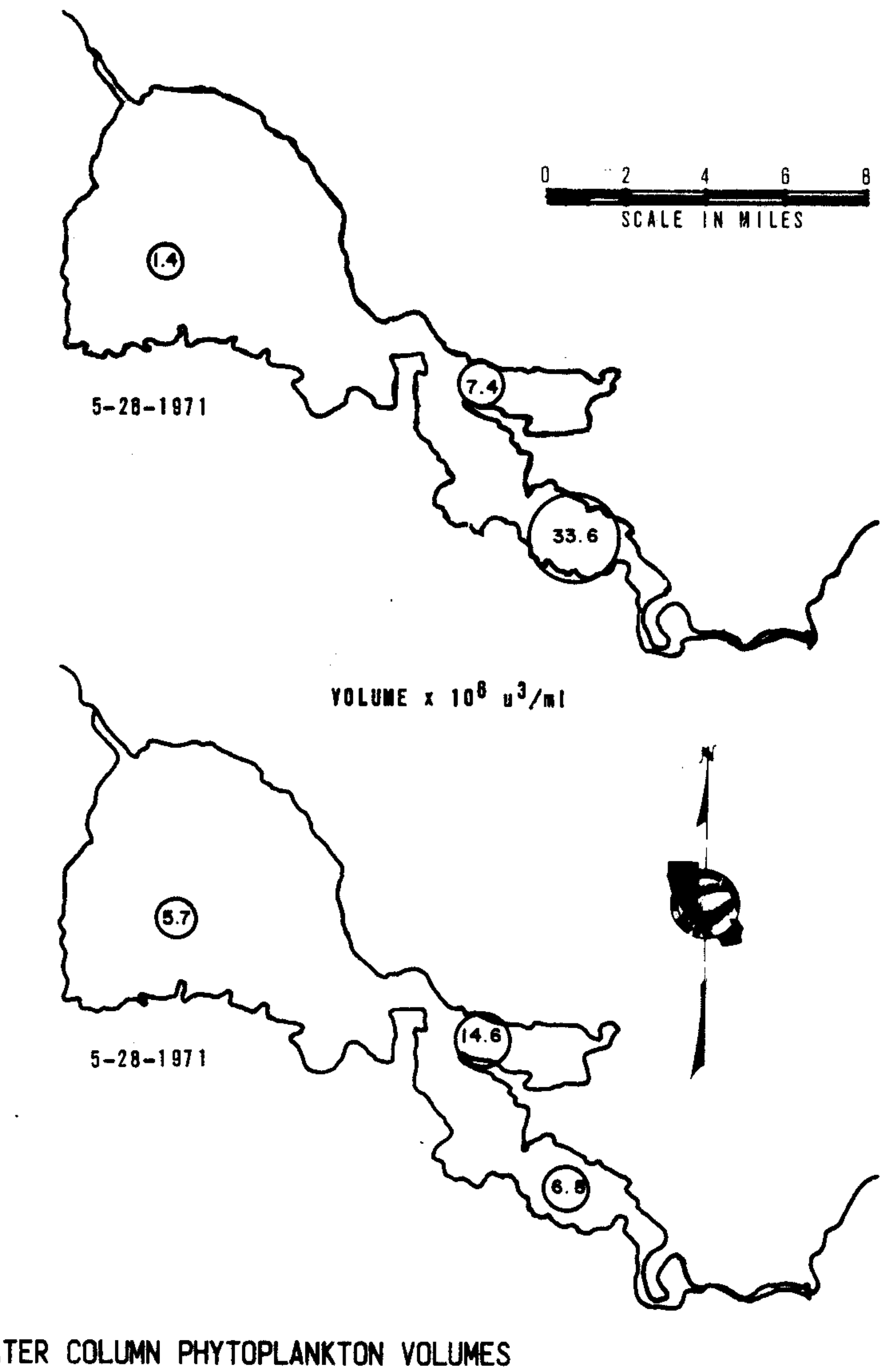

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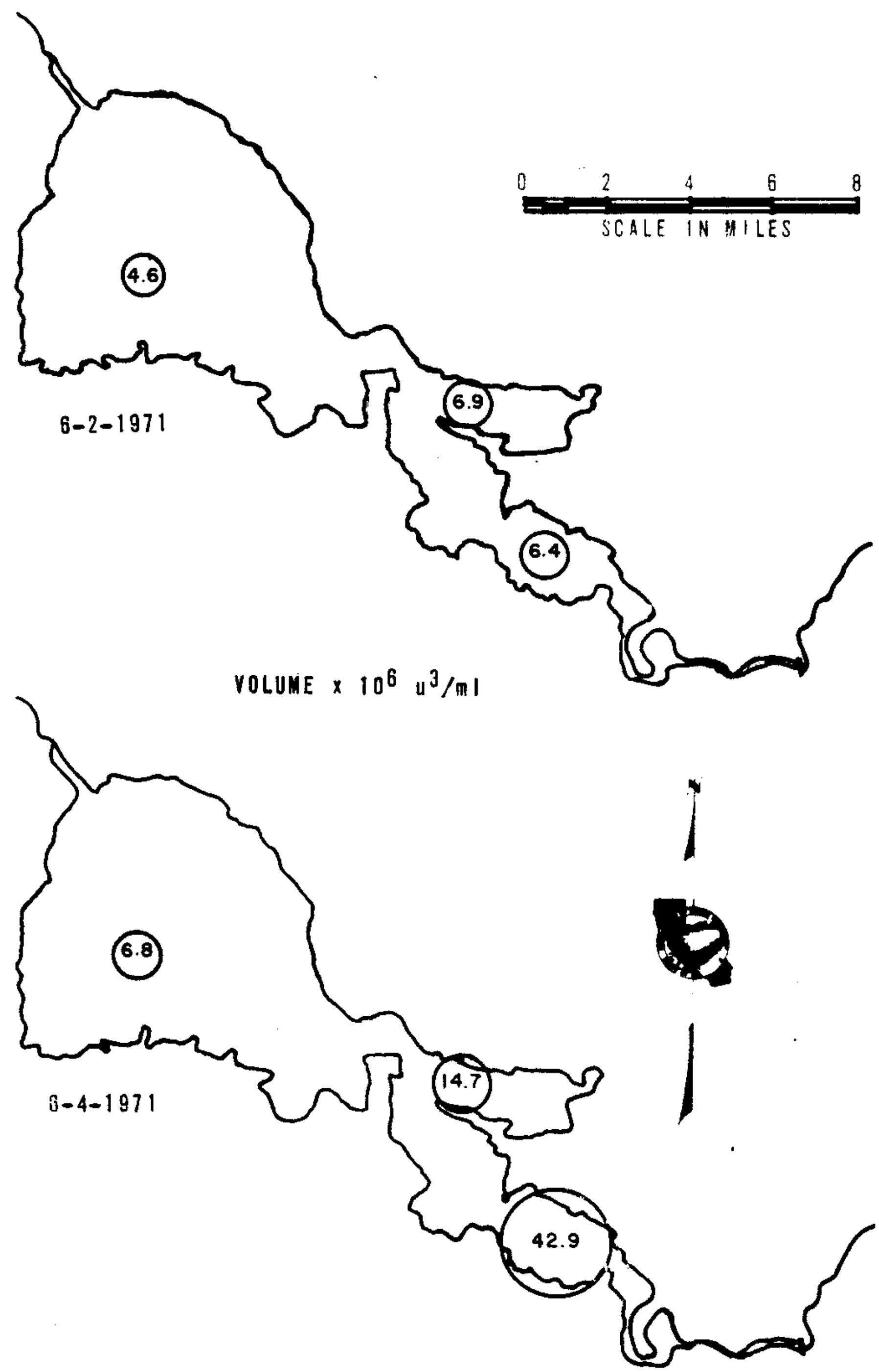

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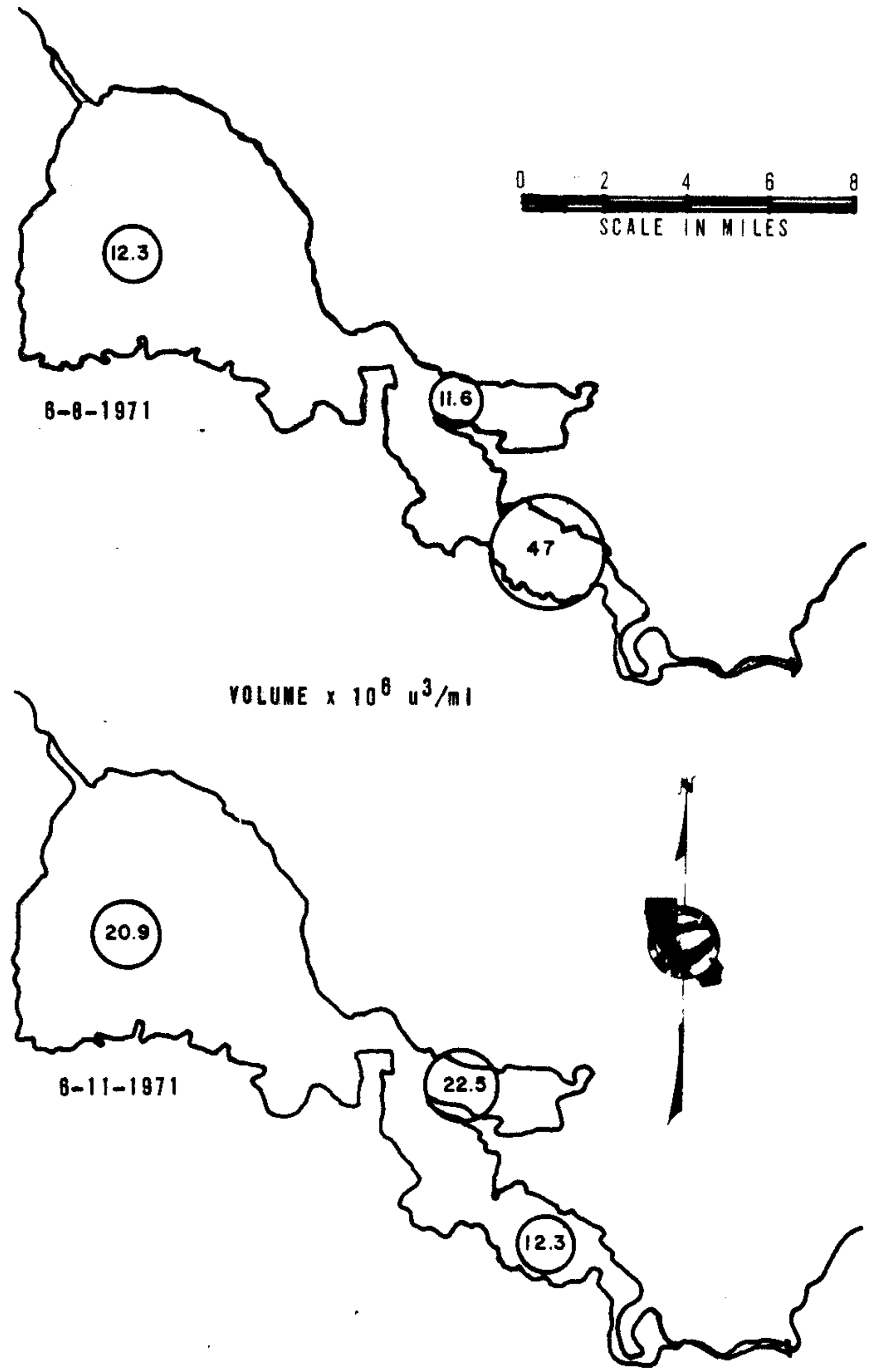

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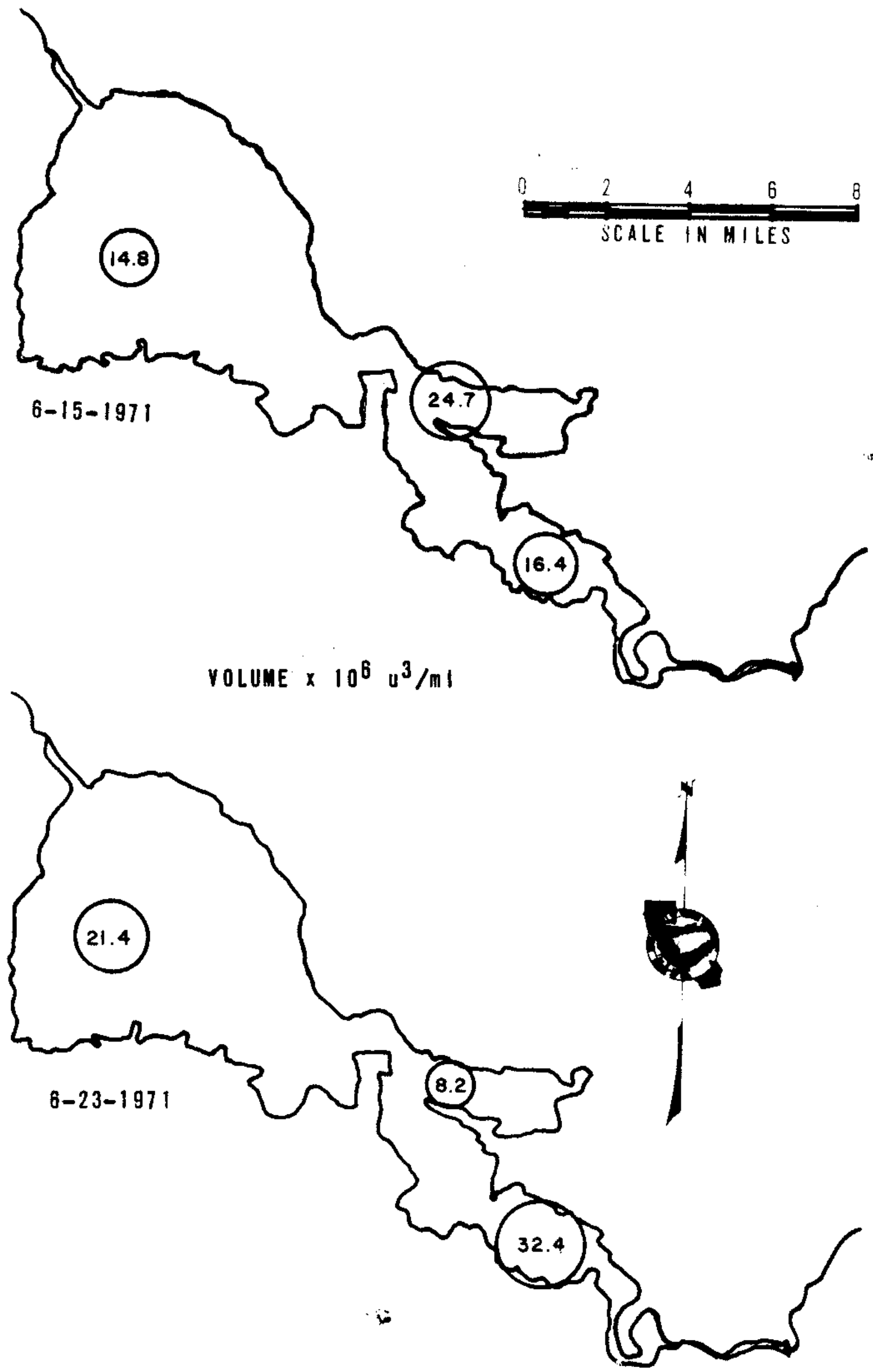

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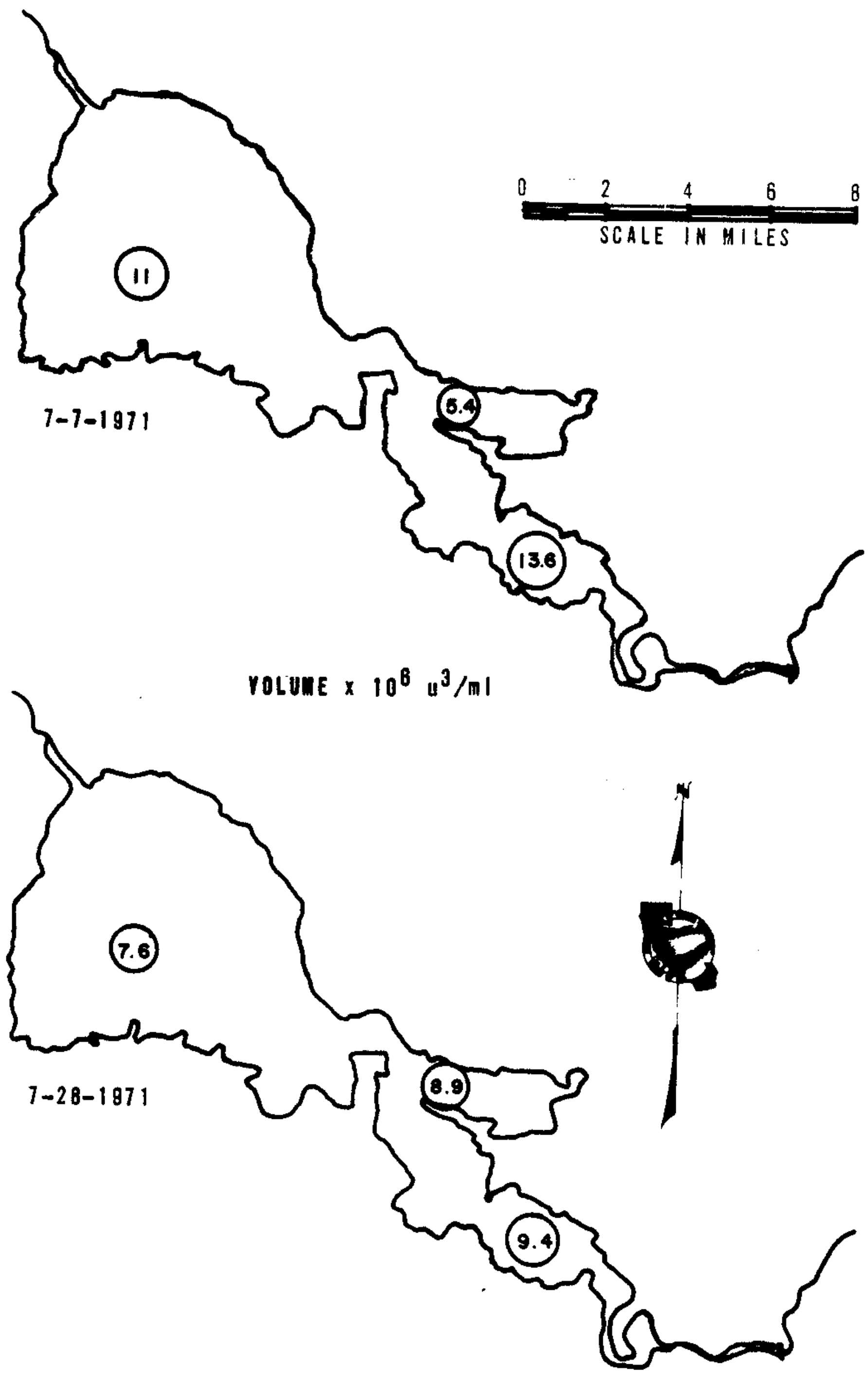

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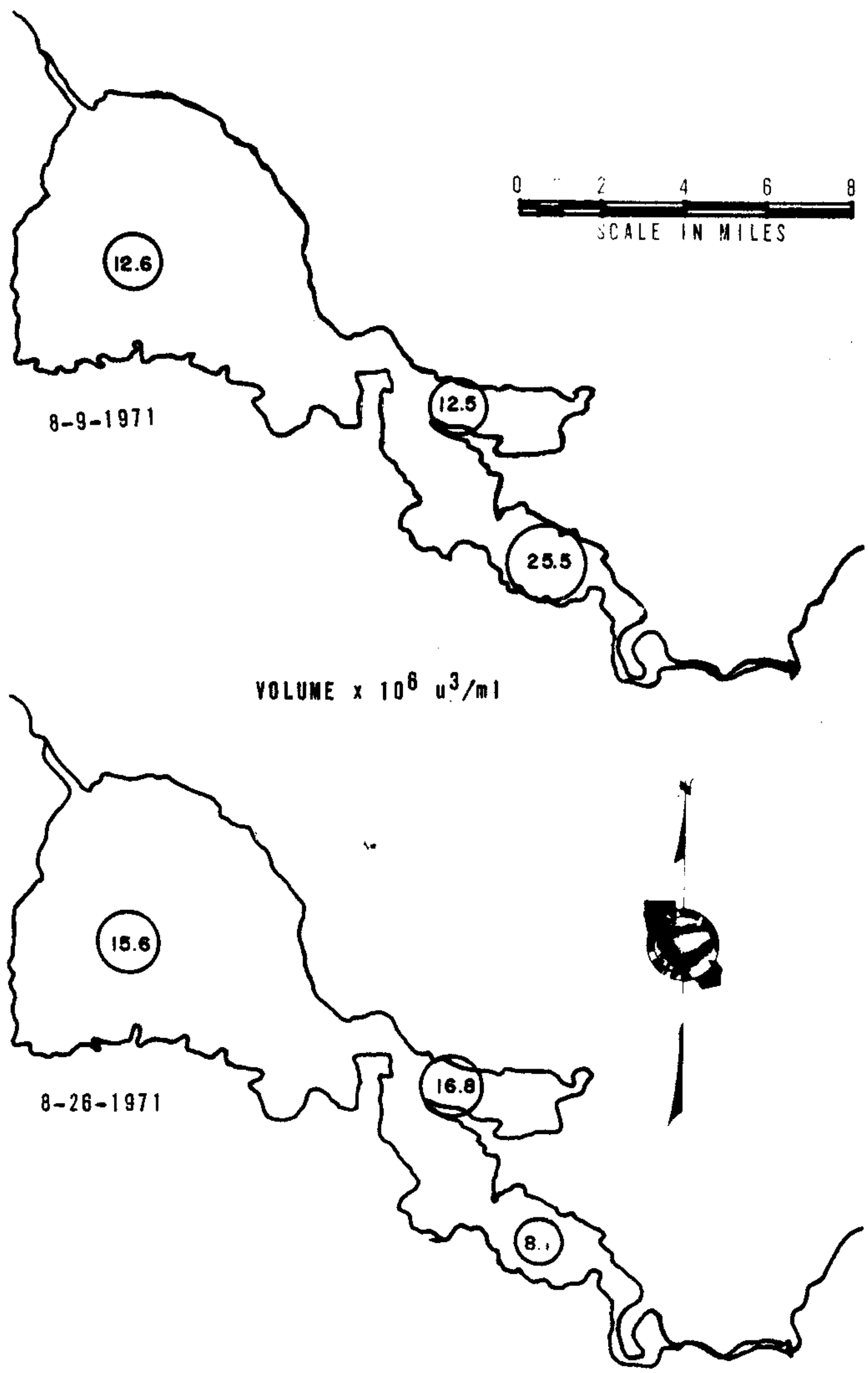

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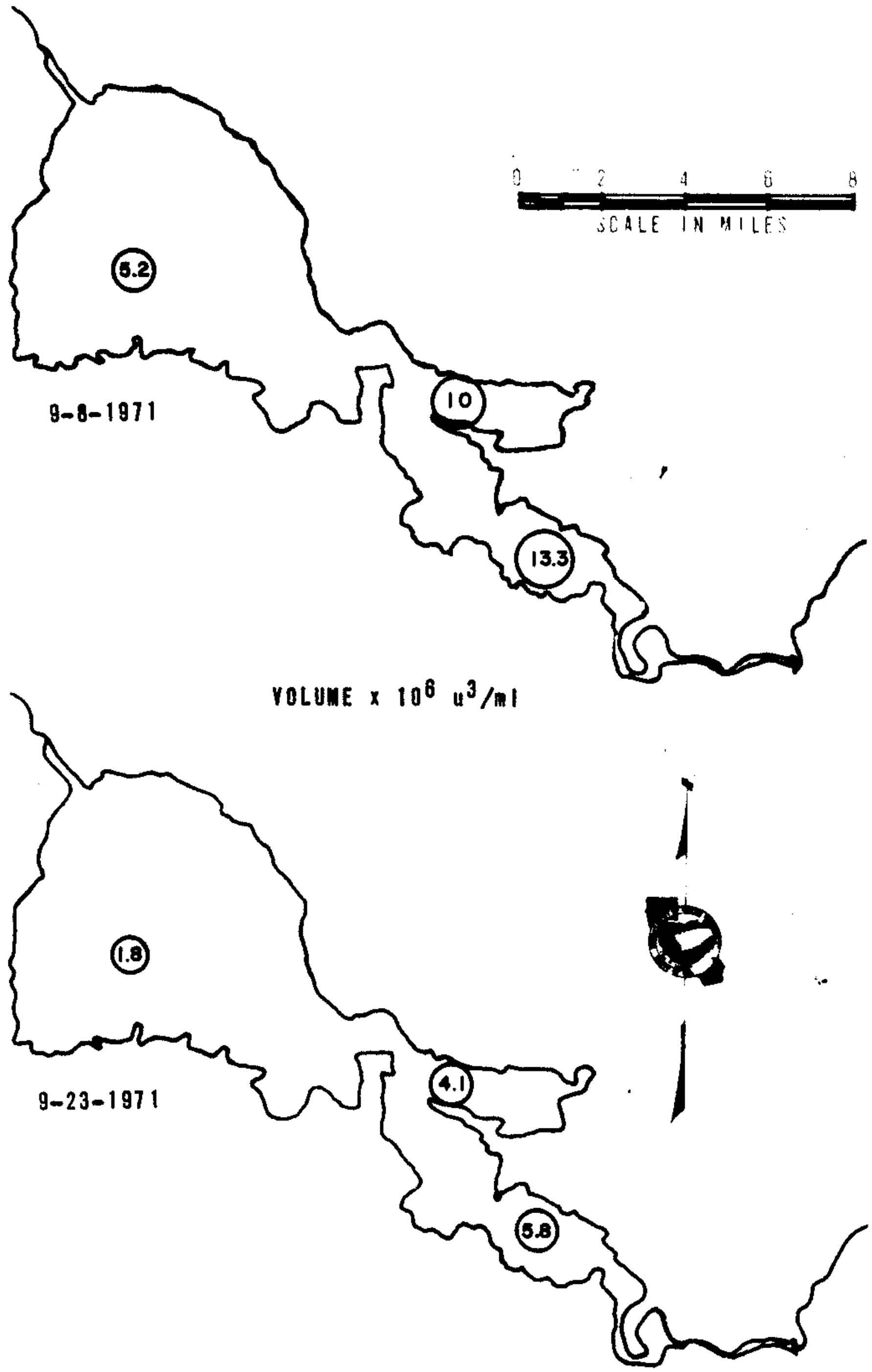

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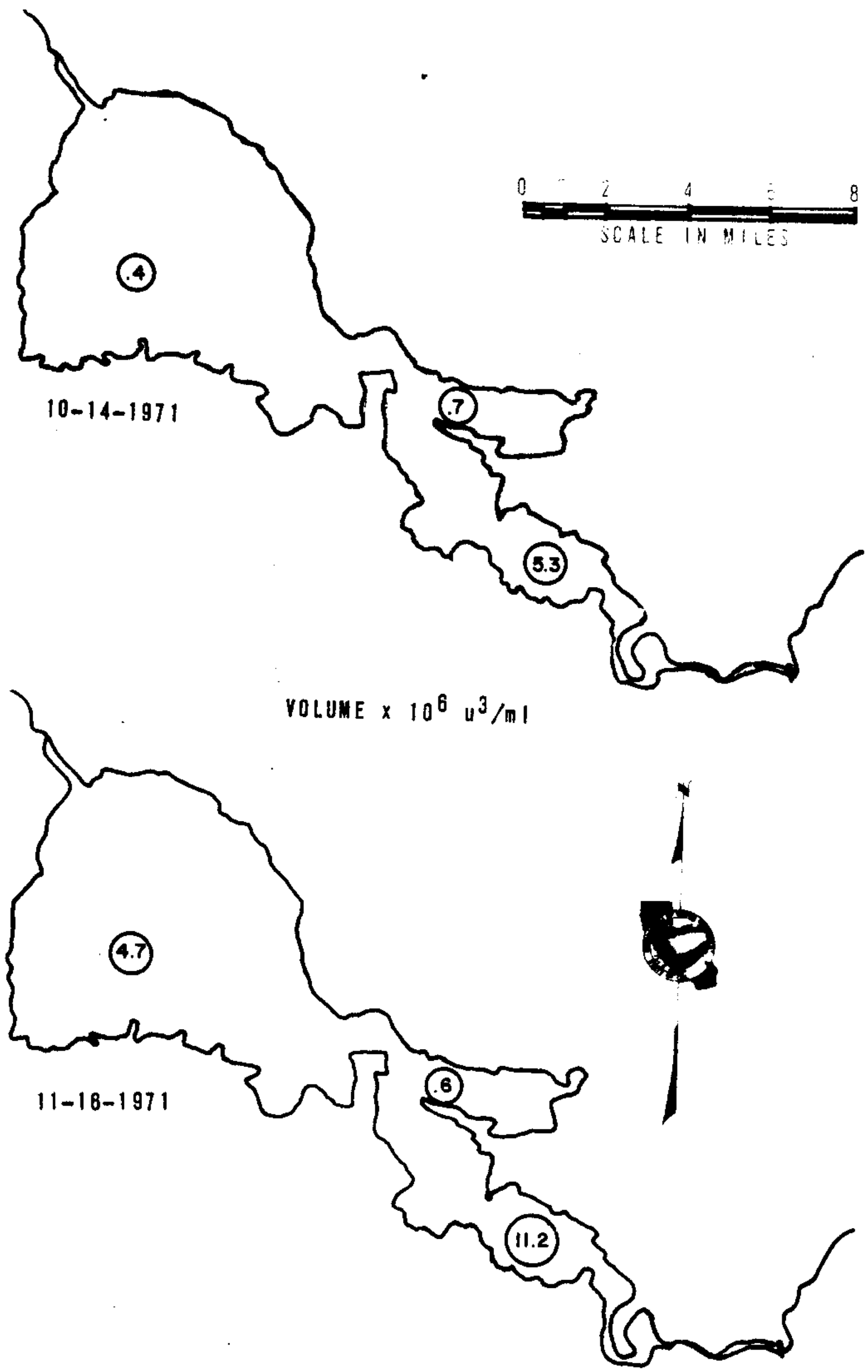

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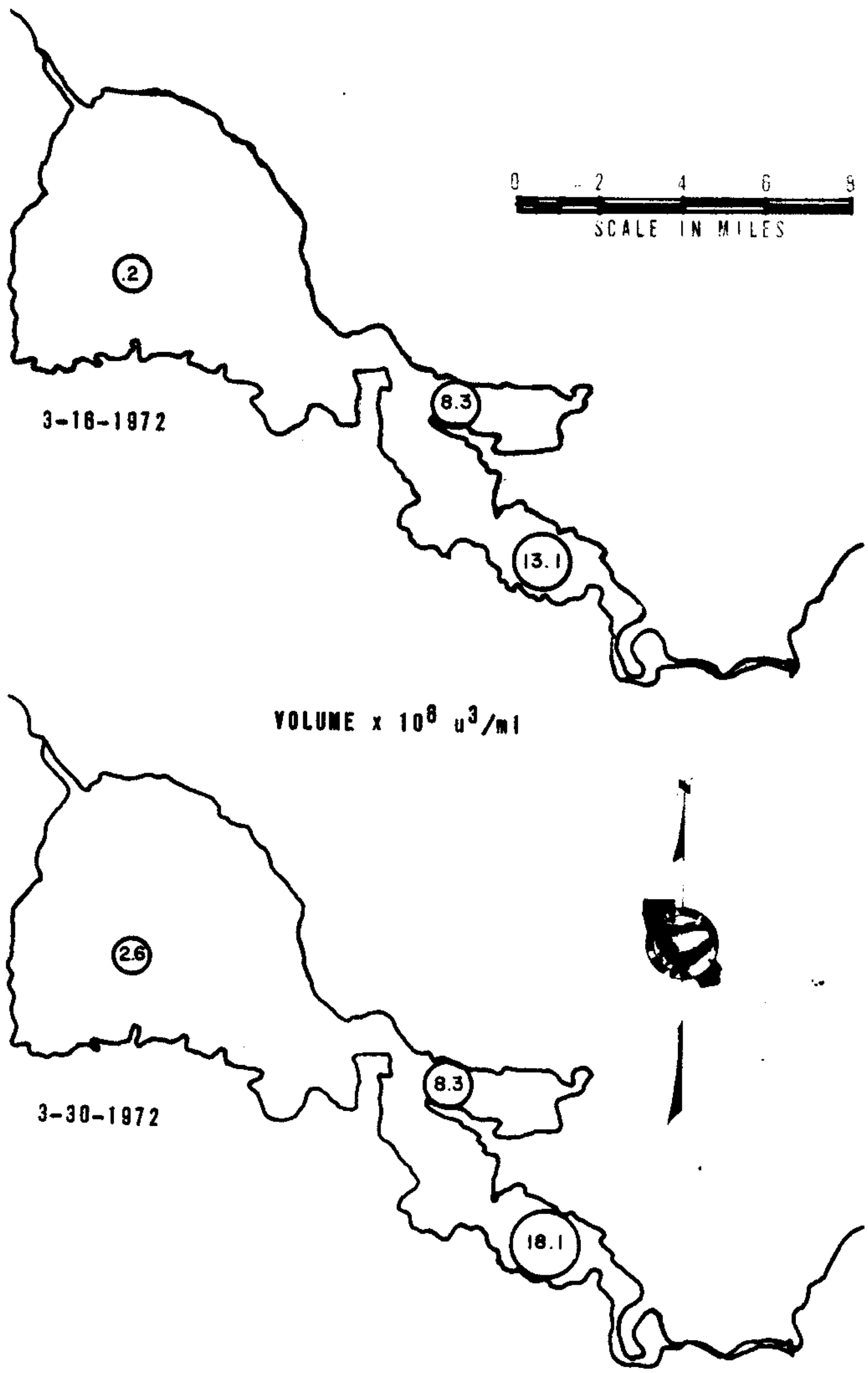

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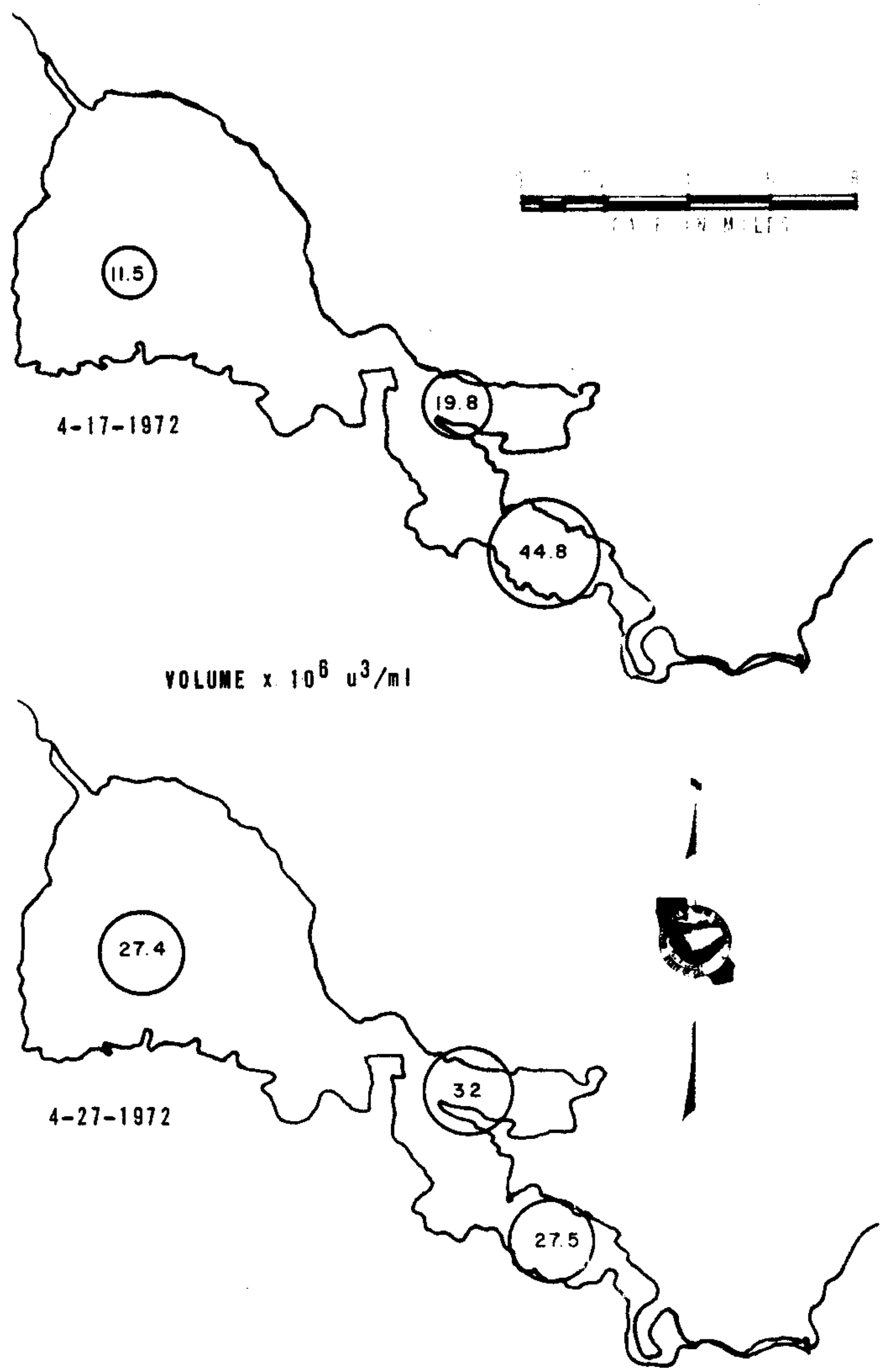

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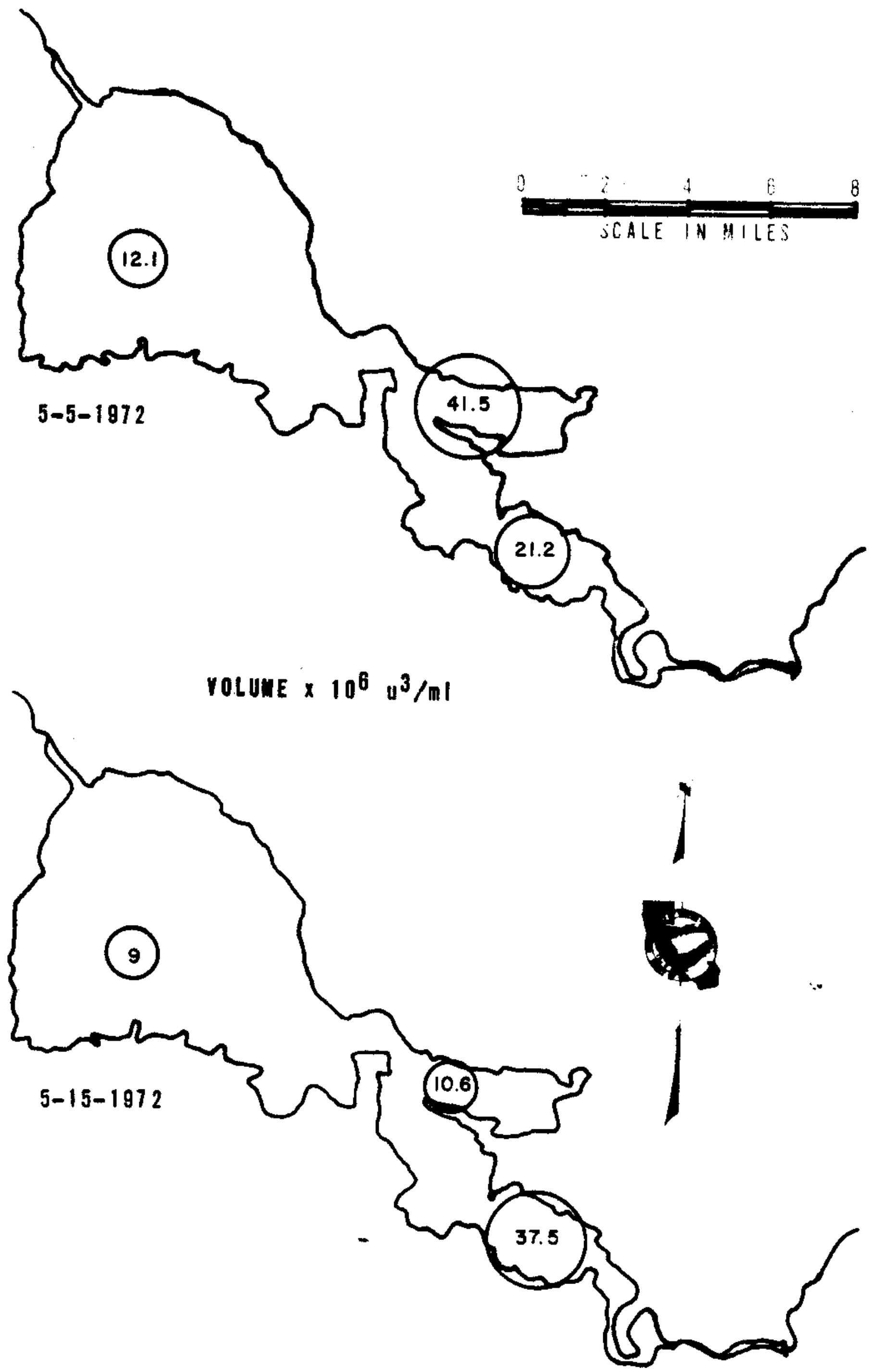

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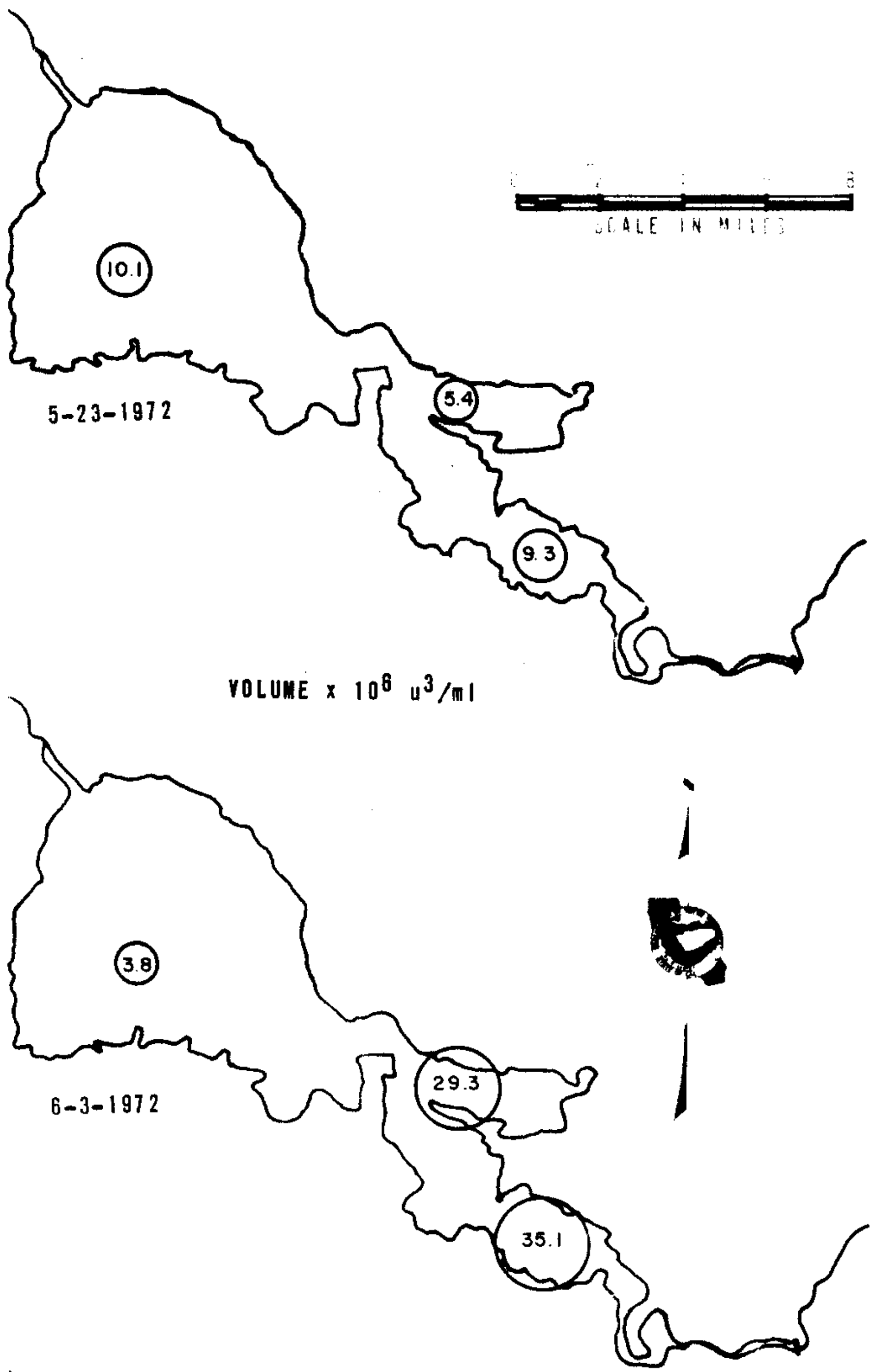

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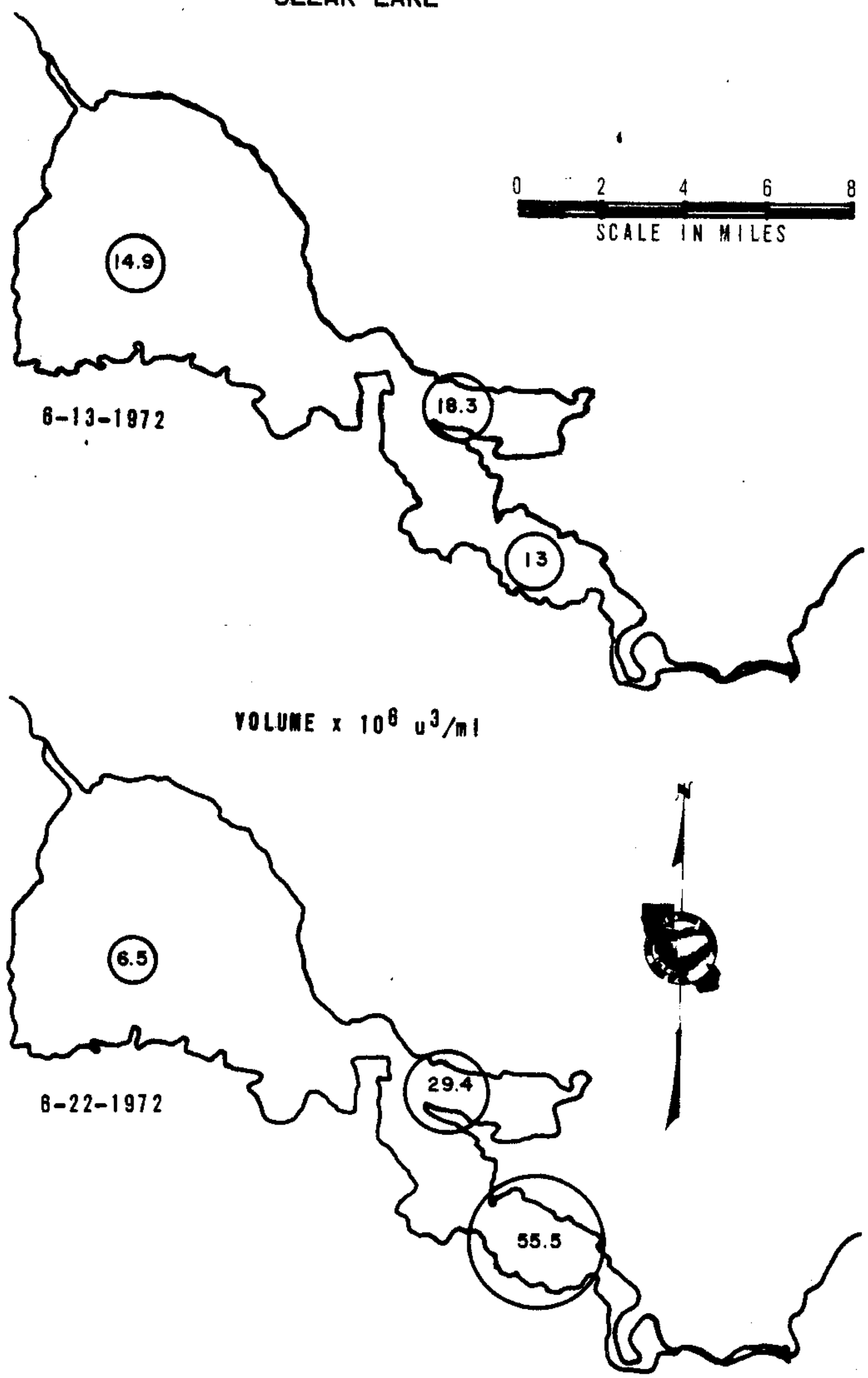

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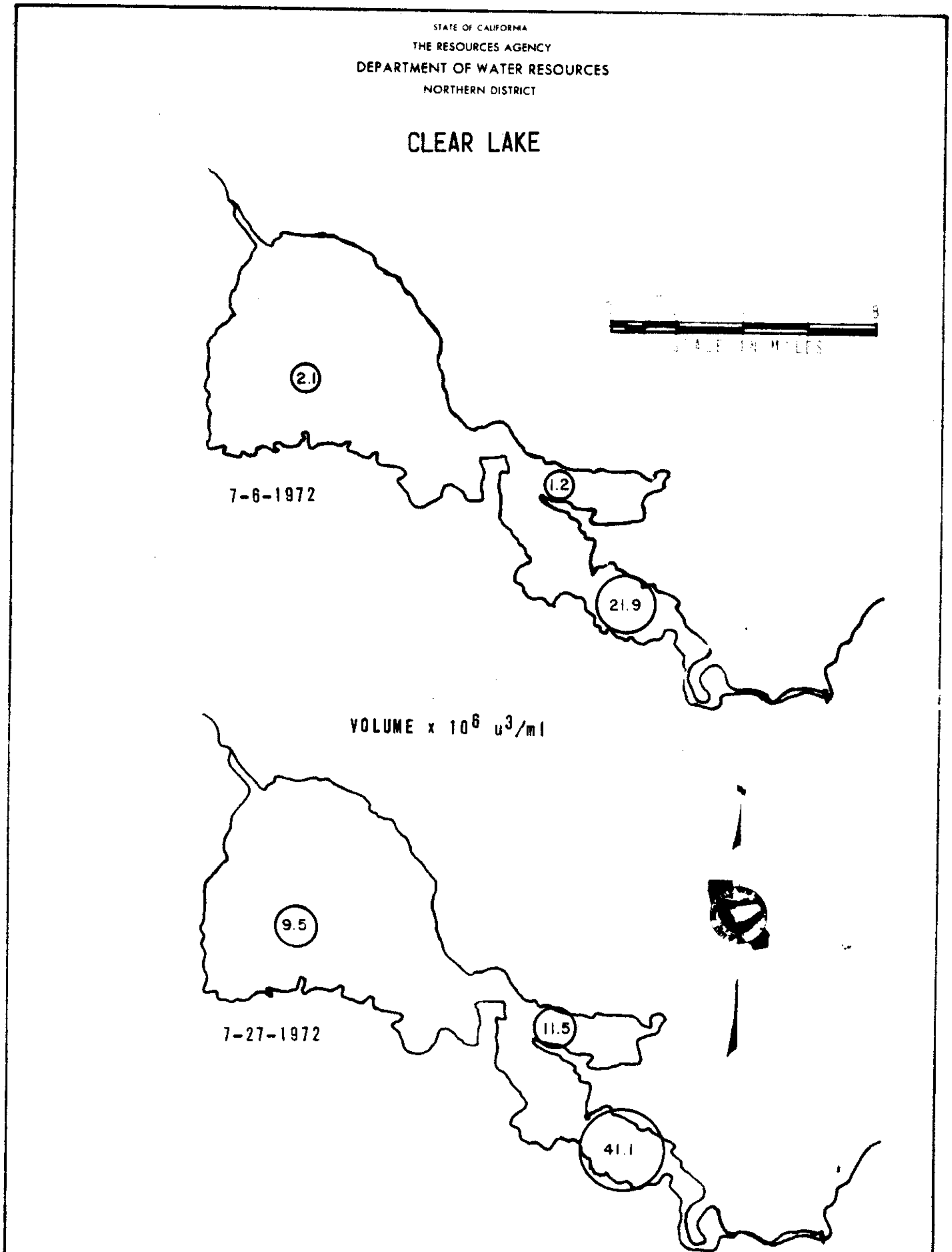

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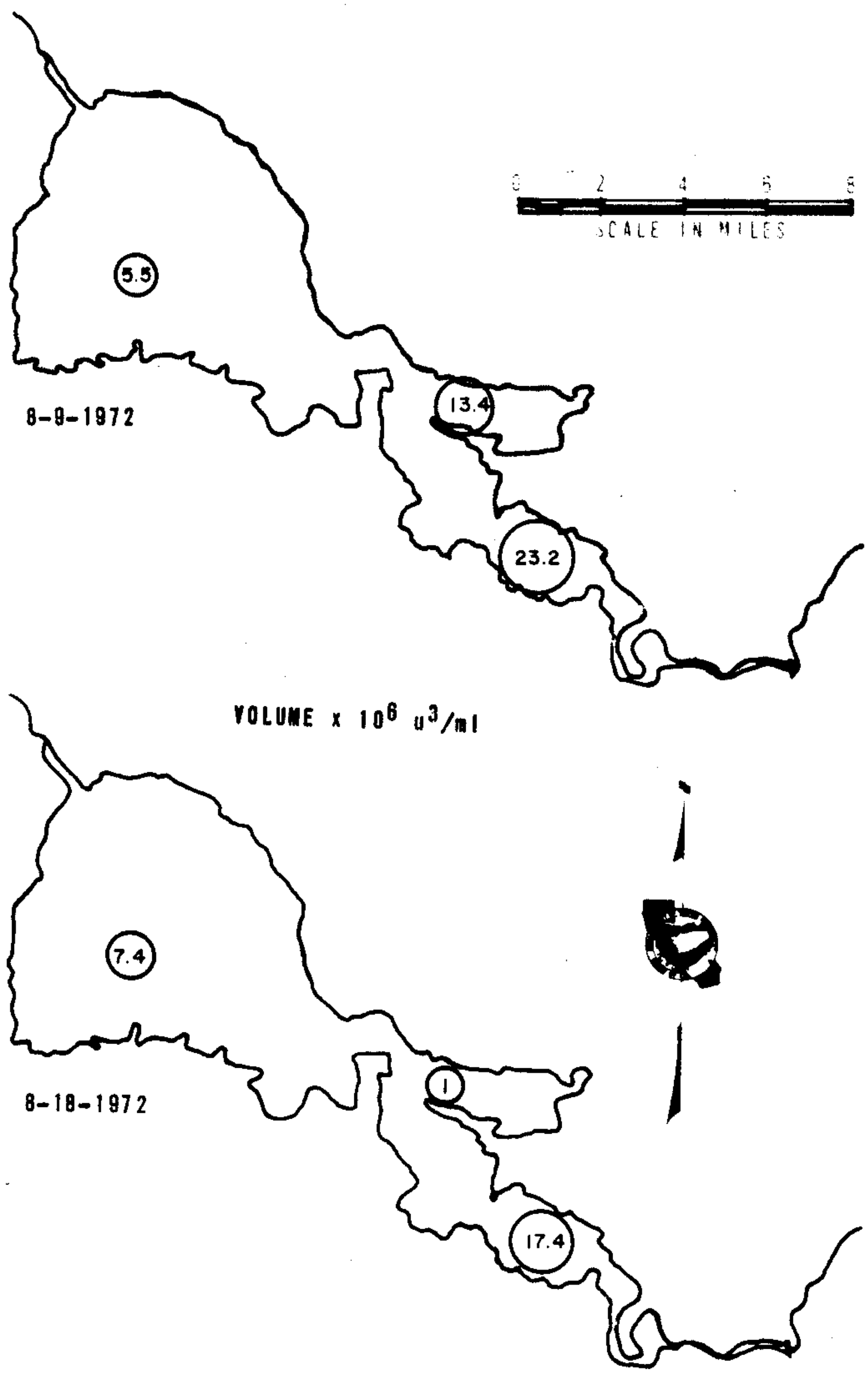

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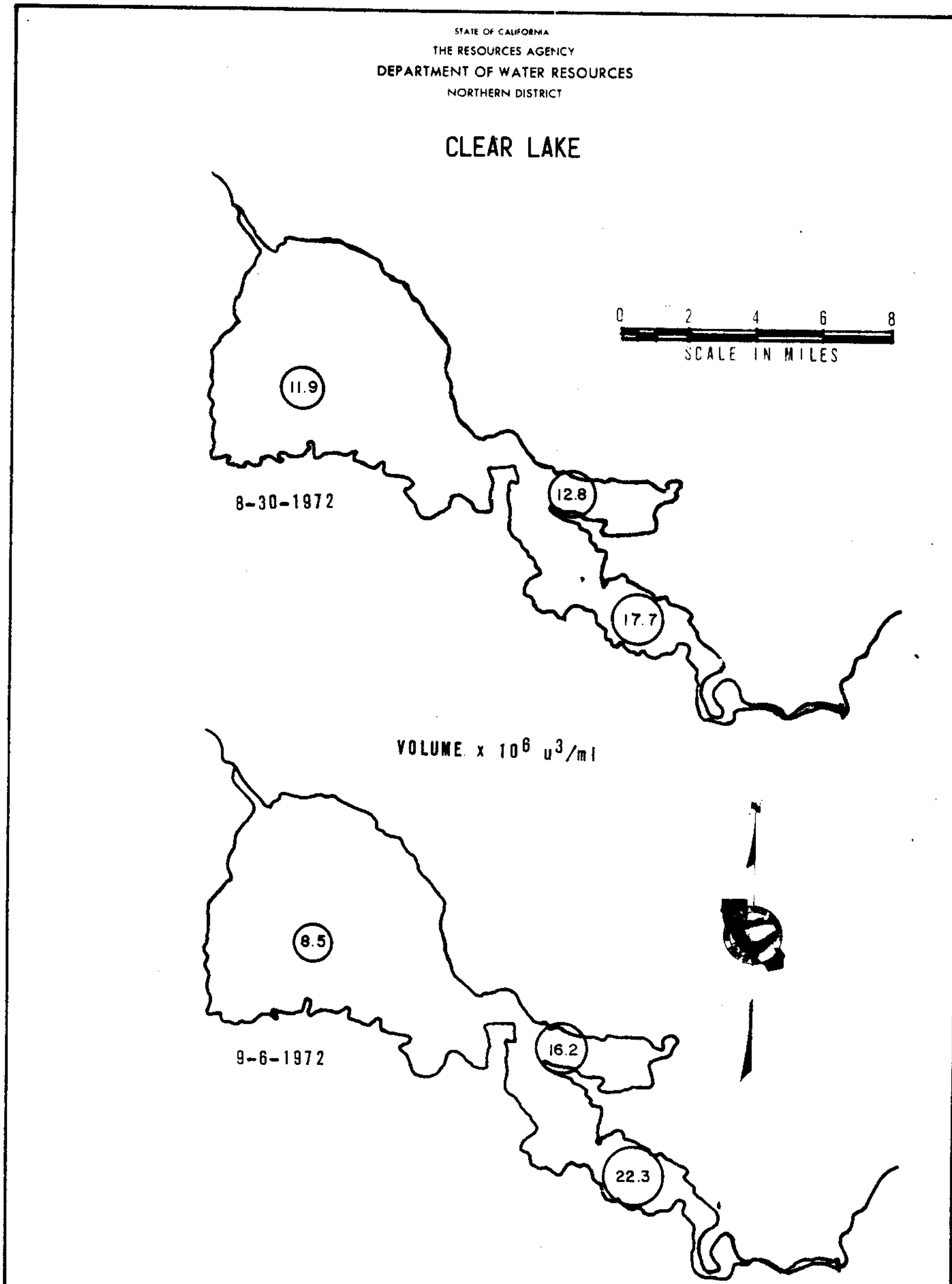

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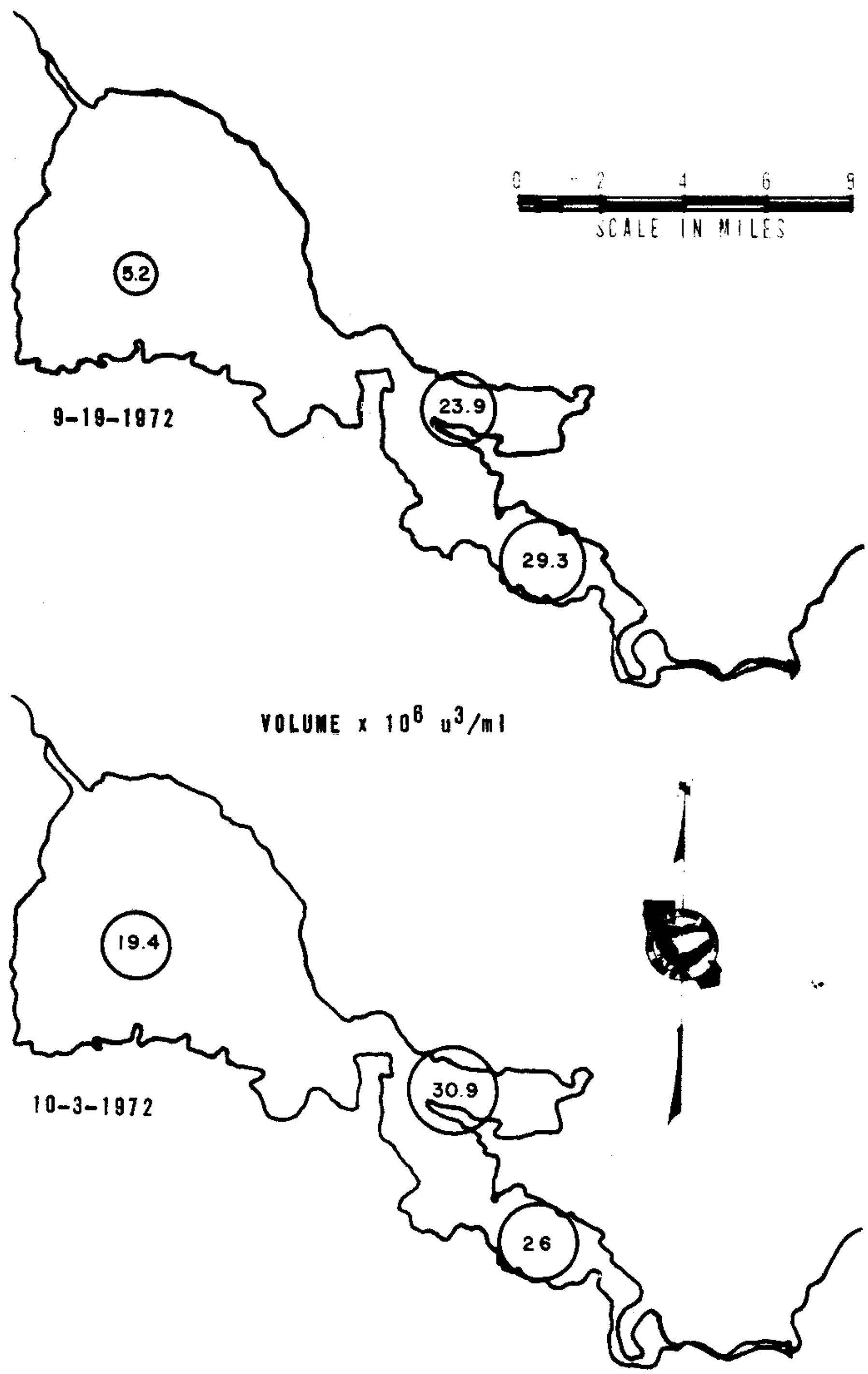

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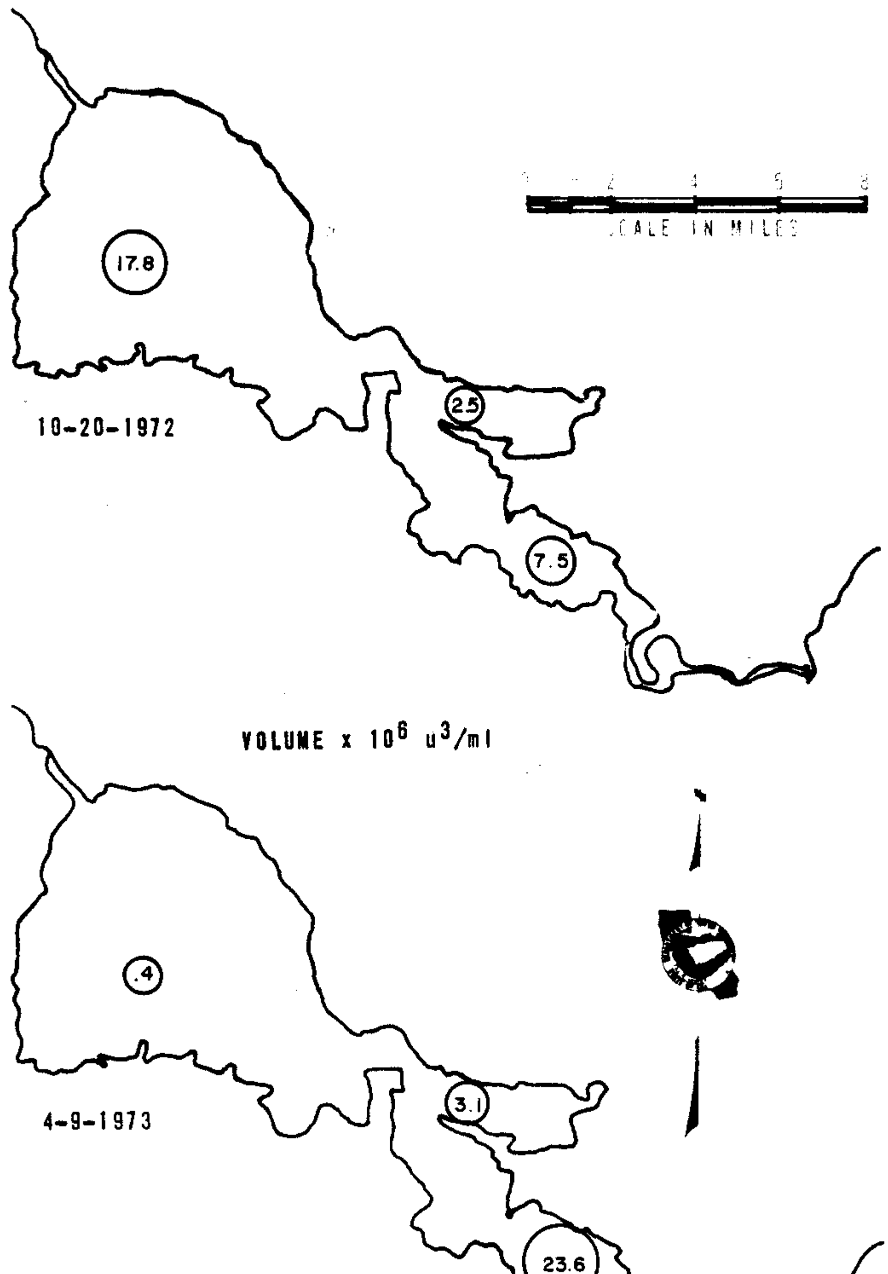

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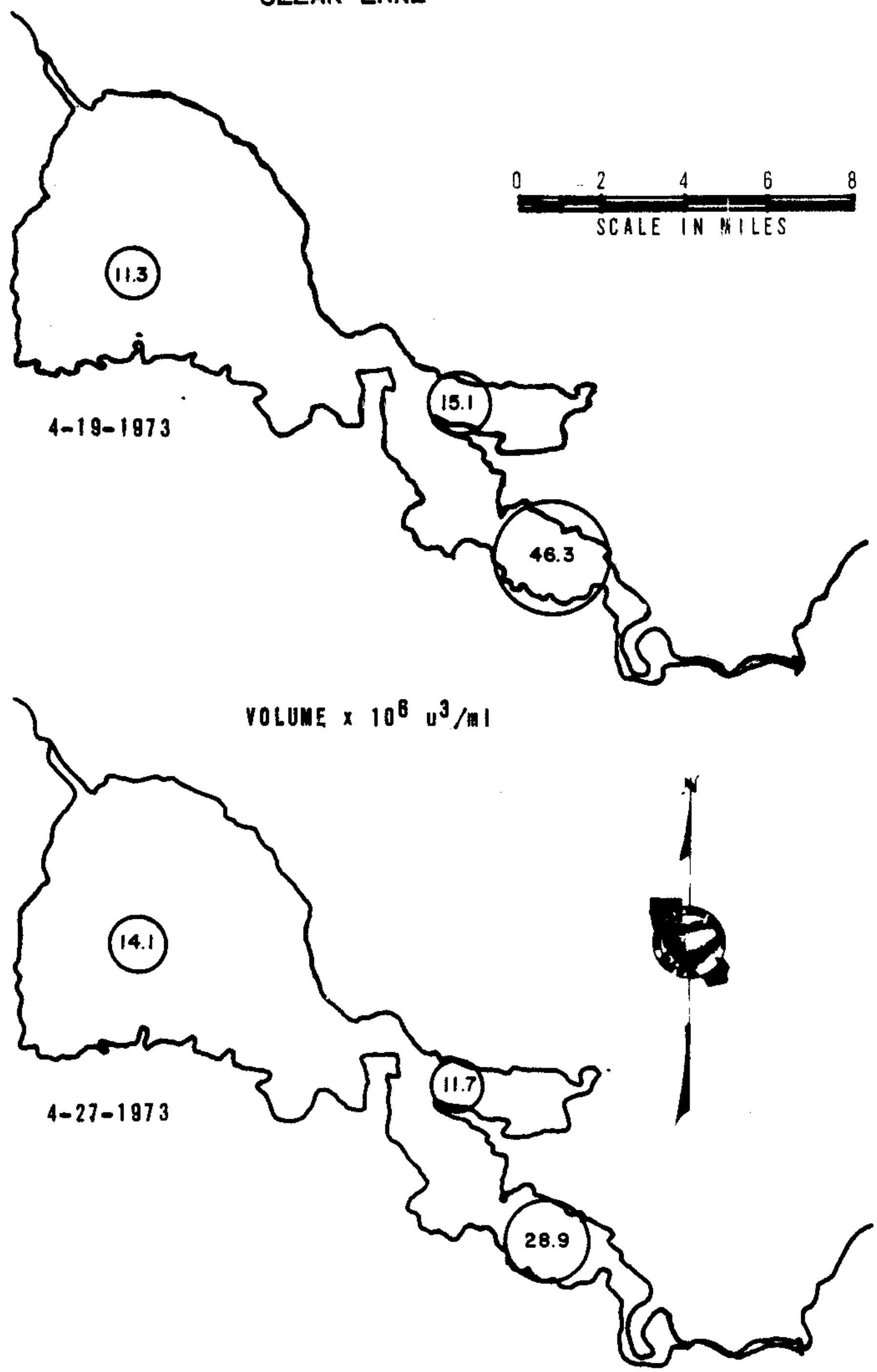

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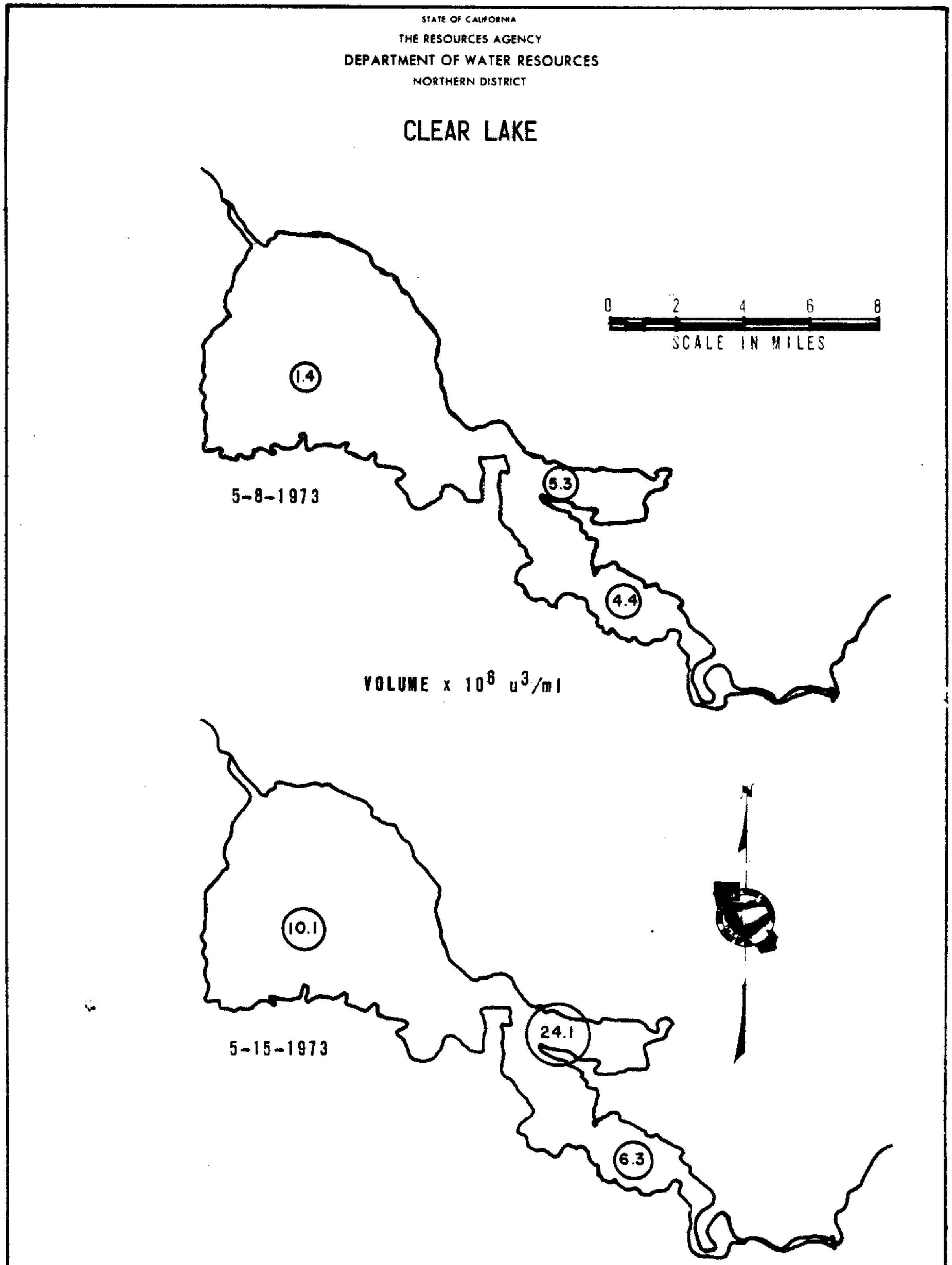

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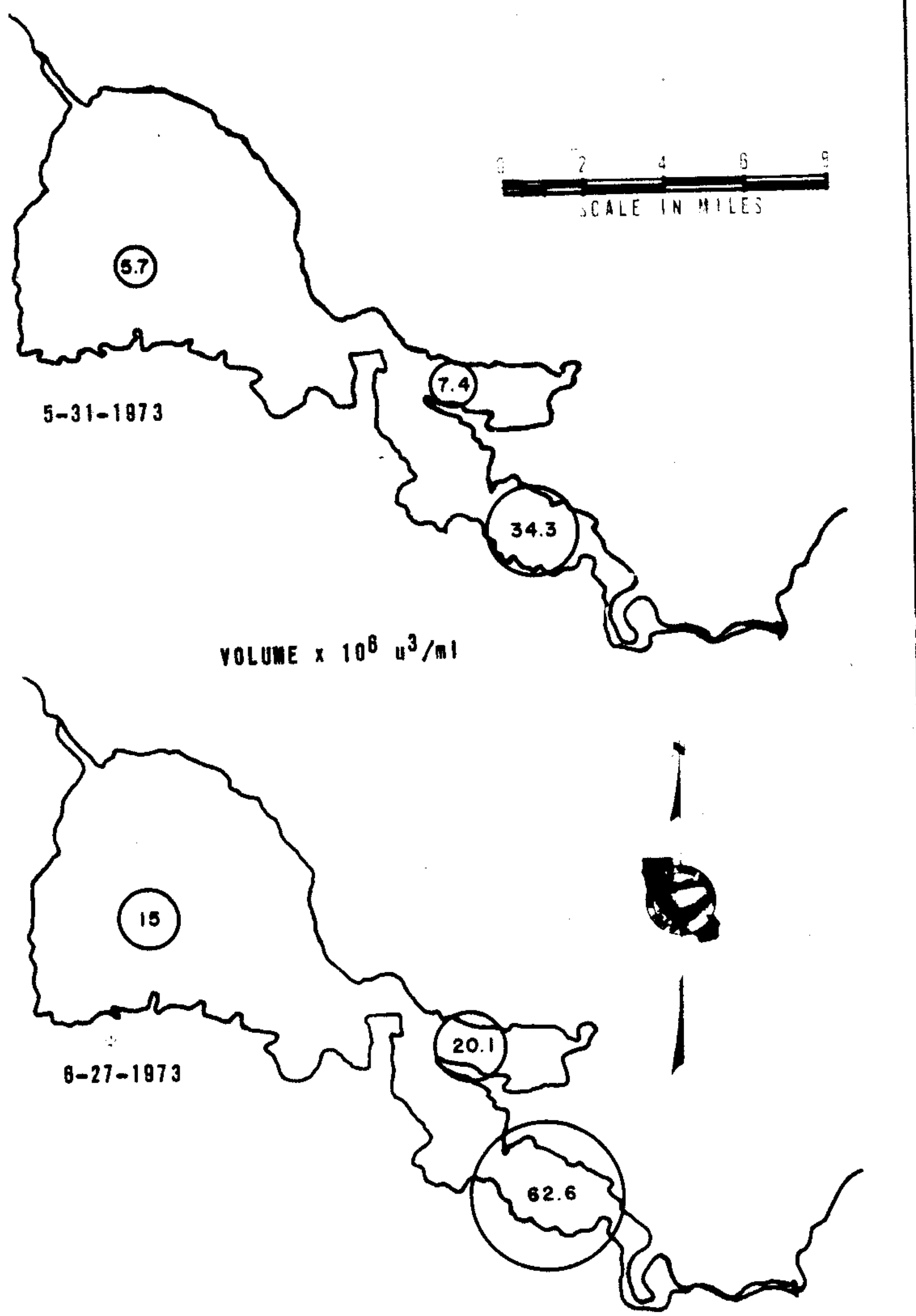

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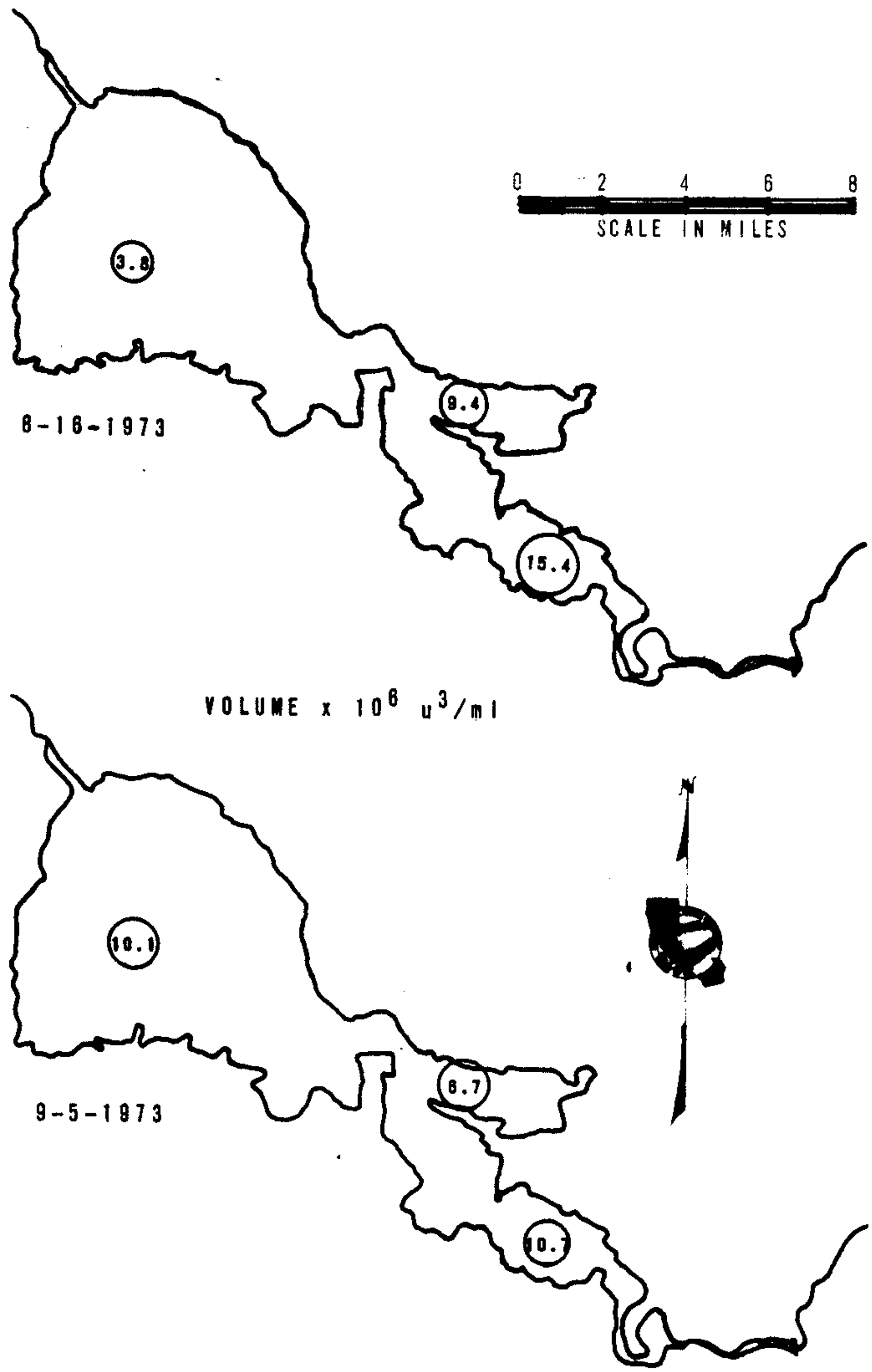

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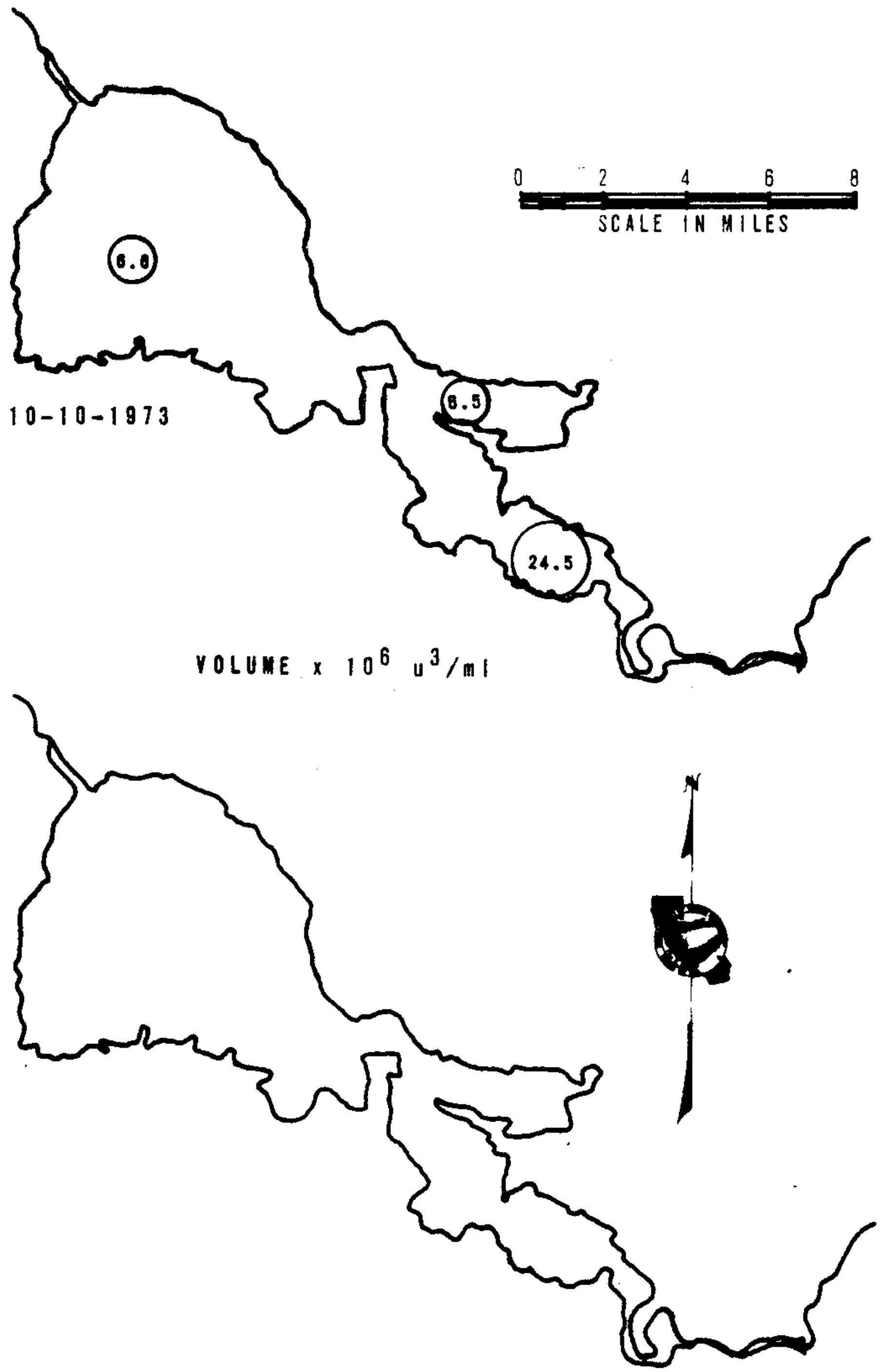

AVERAGE WATER COLUMN PHYTOPLANKTON VOLUMES

CONVERSION FACTORS

English to Metric System of Measurement

Quantity	English unit	Multiply by	To get metric equivalent
Length	inches	2.54	centimeters
	feet	30.48	centimeters
		0.3048	meters
		0.0003048	kilometers
	yards	0.9144	meters
	miles	1,609.3	meters
		1.6093	kilometers
Area	square inches	6.4516	square centimeters
	square feet	929.03	square centimeters
	square yards	0.83613	square meters
	acres	0.40469	hectares
		4,046.9	square meters
		0.0040469	square kilometers
	square miles	2.5898	square kilometers
Volume	gallons	3,785.4	cubic centimeters
		0.0037854	cubic meters
		3.7854	liters
	acre-feet	1,233.5	cubic meters
		1,233,500.0	liters
	cubic inches	16.387	cubic centimeters
	cubic feet	0.028317	cubic meters
	cubic yards	0.76455	cubic meters
		764.55	liters
Velocity	feet per second	0.3048	meters per second
	miles per hour	1.6093	kilometers per hour
Discharge	cubic feet per second or second-feet	0.028317	cubic meters per second
Weight	pounds	0.45359	kilograms
	tons (2,000 pounds)	0.90718	tons (metric)
Power	horsepower	0.7460	kilowatts